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DEMOGRAPHIA
COMMENTARY

Smart Growth Pros & Cons

A principal imperative of "smart growth" is to stop the geographical expansion ("sprawl") of urban areas and make them more compact (more dense). Some of the most important strategies for making more urban areas more dense are land rationing, often through urban growth boundaries and other measures that severely limit the amount of land that can be used for development, such as development rationing through impact fees.

A number of rationales have been used to support densification and land rationing. However, not all agree that smart growth has conclusively demonstrated any imperative that justifies its proposed strategies. A group of academics and researchers believe that the "smart growth" movement has not identified any problem of sufficient imperative to justify a number of its strategies, including land rationing. They (including this author) have drafted a statement of market oriented land use principles, called the *Lone Mountain Compact*, which asserts:

> *The most fundamental principle is that, absent a material threat to other individuals or the community, people should be allowed to live and work where and how they like.*

Arguments and counter-arguments follow.

Argument for Smart Growth: Farmland is being lost due to urbanization

> **Counter-Argument:** New urbanization in the United States has equaled less than one-fifth of the land taken out of agricultural production. Most farmland loss is due to productivity, not urbanization. There is no threat to food supply from urbanization, according to the US Department of Agriculture.

Argument for Smart Growth: Open space is being threatened by urban expansion.

> **Counter-Argument:** More land has been preserved in rural parks than has been consumed in urbanization since 1950.[1] Open space has been considerably increased, especially due to the reduction in farmland that has occurred because of improved productivity.

Argument for Smart Growth: More dense urban areas are required to reduce traffic congestion.

> International and US data show that traffic congestion is less where there urban areas are *less* dense.

Argument for Smart Growth: More dense urban areas are required so that the "transit choice" can be provided and dependence on the automobile reduced.

> **Counter-Argument:** To provide transit choice for more than a small minority of trips would require densification far in excess of that imaginable in modern urban areas, whether in the US or Europe.

Argument for Smart Growth: More dense urban areas are required to reduce travel times.

> **Counter-Argument: International and US data show that work trip travel times are shorter where urban areas are *less* dense.**

Argument for Smart Growth: The cost of living is lower in more dense urban areas.

> **Counter-Argument: While transportation costs are greater in more sprawling urban areas, lower housing costs more than make up the difference, making the overall cost of living lower where sprawl is greater.**

Argument for Smart Growth: More dense urban areas are more equitable for low-income households

Counter-Argument: **Overall home ownership rates and black home ownership rates tend to be higher where there is more sprawl.**

Argument for Smart Growth: More dense urban areas are required to reduce air pollution.

Counter-Argument: **International and US data show that is air pollution is less intense where urban areas are *less* dense.**

Argument for Smart Growth: More dense urban areas have lower infrastructure costs.

Counter-Argument: **Infrastructure costs are generally lower in *lower* density urban areas. Higher density cities tend to have higher tax burdens per capita[2]**

Argument for Smart Growth: **Urban sprawl has been at the expense of central cities.**

The overwhelming percentage of US suburban growth (85 percent) has been natural growth and from rural areas, rather than from central cities. Suburbanization is universal in high-income nations and urban densities have been falling at an even greater rate in Europe and Canada.

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[1] www.demographia.com/db-urb&rpk.htm.

[2] See: Wendell Cox and Joshua Utt, *The Costs of Sprawl Reconsidered: What the Data Really Shows*

THE
IMPACT OF SMART GROWTH ON HOUSING AFFORDABILITY

An Analysis of Metropolitan Markets by Land Use Planning System

Atlanta • Dallas-Fort Worth • Indianapolis • Kansas City
Boston • Portland • San Diego • Washington

POLICY REPORT

Available at
http://www.demographia.com/dhi-us8.pdf

DEMOGRAPHIA

January 2008

Table of Contents

Note: A more complete analysis will be found in the working paper at
http://www.demographia.com/dhi-us8w.pdf

Cover Illustrations
Kansas City (Left); Portland (Right)

EXECUTIVE SUMMARY

Introduction

House prices have risen substantially in the United States over the past decade. There is disagreement over the causes. Many economists are of the view that house prices have risen because of prescriptive (or "smart growth") land use policies. Smart growth advocates deny this claim; though admit that smart growth can increase housing prices under some circumstances.

This report compares prices and trends in markets with and without smart growth. The purpose is to determine whether price increases can be attributed to smart growth markets and if so, the extent of such increases.

House Prices

House prices and trends are analyzed in four smart growth markets (Boston, Portland, San Diego and Washington) and four markets without smart growth, or responsive markets (Atlanta, Dallas-Fort Worth, Indianapolis and Kansas City). Prices are compared to a "market ceiling," which is an estimate of the highest likely prices in a market without smart growth. Any excess in house price above the corresponding market ceiling is considered regulatory *excess*, the result of more restrictive land use restrictions.

Existing Houses: The median prices of existing houses are analyzed over the period of 1996 to 2006. Underlying market factors changed little between 1996 and 2006 in responsive markets. In both 1996 and 2006, median house prices were below the market ceiling for existing houses in all four responsive markets. In contrast, median house prices were above the market ceilings in all four prescriptive (smart growth) markets in both 1996 and 2006. This "regulatory excess" was 14 percent in 1996 and escalated to 124 percent in 2006. The much higher rate of increase in prescriptive markets cannot be attributed to inflation, which was, in fact, higher between 1996 and 2006 in the responsive markets.

New Houses: The prices of new starter houses were also evaluated. New house prices were below the normal market limit in all four responsive markets. By contrast, new house prices were above the market ceiling in all four smart growth markets. On average, this regulatory excess was 84 percent above the market ceiling.

Conclusion: Smart Growth and Housing Prices: Demand is rejected as the cause of higher prices in smart growth markets, since the same demand inducing more liberal loan products have been available in all markers, not just smart growth markets. Moreover, no normal market factors were identified that would justify the materially higher prices or price increases in the smart growth markets compared to the responsive markets. Thus, ***it is concluded that smart growth increases housing prices.***

Implications

There are potentially serious implications to the conclusion that smart growth raises housing prices. These consequences are already becoming evident.

- In the prescriptive markets, the share of median household income required for a mortgage on the median priced house doubled between 2000 and 2006 (from 23 percent to 46 percent). There was no change in responsive markets (19 percent). Lower home ownership rates and a lower standard of living are likely outcomes of the higher housing prices created by smart growth.

- First homebuyers are finding it much more expensive to make house purchases. The Quintile Multiple indicates that first homebuyers are likely to have to pay nearly six years of income more than the median household.

- Because of their generally lower incomes, ethnic minorities are required to pay much more relative to incomes than Non-Hispanic White households. Hispanic households must pay 4.0 years more in median income for the median priced house than Non-Hispanic White households. African-American households must pay 4.4 years more in median income for the median priced house than Non-Hispanic White households. It is likely that the home ownership gap between Non-Hispanic White households and minority households will expand because of smart growth's impact on housing prices.

- Federal Reserve Board research indicates that metropolitan areas with more restrictive land use regulation experience less job growth than would be expected with responsive regulation. This declining competitiveness is evident in strong domestic net migration losses in smart growth metropolitan areas.

- Price differences have become so substantial that moving from a prescriptive market to a responsive market saves an average of approximately $650,000 in purchase and financing costs. This is the equivalent of 11 years of household income, or more than one-quarter of a 40-year work career.

Achieving the goals of prescriptive planning may not be possible without destroying housing affordability. This dilemma has led Donald Brash, former governor of the Reserve Bank of New Zealand to propose prohibiting some smart growth policies.

Note: A more complete analysis will be found in the working paper at http://www.demographia.com/dhi-us8w.pdf

THE
IMPACT OF SMART GROWTH ON
HOUSING AFFORDABILITY

An Analysis of Metropolitan Markets by Land Use Planning System

1. HOUSING AFFORDABILITY IN THE UNITED STATES

In recent years, on average, housing has become less affordable in the United States.

The Two-Speed Housing Market: The Debate

However, national data obscures differing levels of housing affordability. Housing is no longer affordable in some markets, but it remains affordable in other markets. There is strong disagreement about the causes of the higher housing prices that have emerged in some metropolitan markets.

Economists, as liberal Paul Krugman of *The New York Times* and conservative Thomas Sowell of the Hoover Institution attribute the geographically focused house cost escalation to prescriptive land use regulation. Central (reserve) bankers in the United Kingdom, Australia and New Zealand have also noted the connection between higher house prices prescriptive land use planning.[1] An Organization for Economic Cooperation and Development (OECD) report noted an association between strongly regulated land markets and higher housing prices.[2]

Prescriptive planning systems, often called "smart growth" can severely limit development, such as by prohibiting development on the urban fringe, establishing large development prohibited zones and impose significant, imposing large lot zoning in rural areas and charging expensive development impact fees. The economic view is that land use regulations, such as urban growth boundaries and minimum building lot sizes in some areas have resulted in land rationing, leading to materially higher house prices.

Proponents of smart growth generally claim that their policies do not raise house prices. In fact, most authoritative "smart growth" volume, *Costs of Sprawl – 2000,* predicts that

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[1] Including Bank of England Monetary Policy Committee Member Kate Barker (Kate Barker (2004 and 2006). *Review of Housing Supply: Delivering Stability: Securing Our Future Housing Needs: Final Report—Recommendations.* Norwich, England: Her Majesty's Stationery Office. www.hmtreasury), Chairman of the Reserve Bank of New Zealand Arthur Grimes (Arthur C. Grimes, *Housing Supply in the Auckland Region,* Centre for Housing Research Aotearoa New Zealand (2007). http://www.hnzc.co.nz/chr/pdfs/housing-supply-in-the-auckland-region-2000-2005.pdf.) and Former Chairman of the Reserve Bank of New Zealand Donald Brash (see below). Statements indicating the relationship between higher fringe housing costs and prescriptive planning have also been made by former Reserve Bank of Australian Governor Ian MacFarland and present Governor Glenn Stephens.

[2] "Recent House Price Developments: The Role of Fundamentals," *OECD Economic Outlook #78* (2005), http://www.oecd.org/dataoecd/41/56/35756053.pdf.

new house prices will fall in prescriptive markets relative to those in responsive markets. At the same time, proponents indicate the potential for their strategies to result in higher housing prices, if they are not properly implemented.[3] Smart growth proponents often suggest that the higher housing prices have been caused by greater demand, especially from more liberal mortgage loan practices.

Land use planning regulations in the United States have been comparatively responsive to the market since World War II. This regulatory regime allowed residential construction on inexpensive urban fringe land. This was a principal factor driving suburbanization and a much higher home ownership rate in the United States. Home ownership rates rose from approximately 40 percent in 1940 to nearly 70 percent by 2000.

However, in recent decades, some areas have abandoned these "responsive" planning systems and imposed more "prescriptive" planning or smart growth models.

This report compares house prices and trends relative to incomes in eight representative metropolitan markets, including four responsive markets (Atlanta, Dallas-Fort Worth, Indianapolis and Kansas City) and four prescriptive planning markets (Boston, Portland,[4] San Diego and Washington, DC).

The purpose is to identify whether smart growth is associated with higher housing prices, and if so, to identify the extent and outline the policy implications. Existing and new house prices are evaluated in each of the markets. The principal evaluation standard is the "normal market ceiling." (Or "market ceiling"). The market ceiling is an estimate of the highest normal market price that would be expected in a responsive market, or a market without smart growth policies. Any house price above the market ceiling is considered regulatory *excess*.

If, after accounting for normal market condition, prescriptive planning is not associated with higher housing prices, then it will be concluded that smart growth does not increase housing prices. Alternatively, if house prices are materially higher than can be explained by normal market fluctuations in prescriptive markets, then it will be concluded that smart growth increases housing prices. In this case, a finding will be offered with respect to the extent of any smart growth related price escalation, with observations on potential implications.

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[3] *Costs of Sprawl-2000* indicates that higher housing prices can occur from 7 of its 10 recommended smart growth strategies (Robert W. Burchell, George Lowenstein, William R. Dolphin, Catherine C. Galley, Anthony Downs, Samuel Seskin, and Terry Moore, *Costs of Sprawl—2000*. Washington, DC: Transportation Research Board, 2002). A Brookings Institution paper contends that smart growth does not increase housing prices, yet indicates that smart growth can increase housing prices by creating shortages of land for development (Arthur C. Nelson, Rolf Pendall, Casey J. Dawkins and Gerrit J. Knaap. *The Link Between Growth Management and Housing Affordability: The Academic Evidence,* Washington: Brookings Institution, 2002).

[4] Portland is unique among the prescriptive market, with approximately one-fourth of its area outside the state of Oregon, where land use restrictions are considerably less restrictive.

2. EXISTING HOUSE PRICES

Existing house prices and trends are examined using median price ("middle" price) data for 1996 and 2006 and the "Median Multiple" (Box).[5] Median house prices are compared to the market ceiling. The market ceiling for new houses is estimated at 20 percent above the average Median Multiple in non-smart growth markets from 1980 to 2000, based upon data from the John F. Kennedy School of Government (Harvard University).[6] Any excess in median house prices above the market ceiling is considered a regulatory excess.

Box
Median Multiple

The Median Multiple is the median house price divided by the median household income. The Median Multiple is a widely used indicator of housing affordability in urban markets. It is recommended by the World Bank and the United Nations.[7] More elaborate indicators, which may include mortgage interest rates and other factors, mask the structural elements of house pricing. They tend to be not well understood outside the financial sector, though are important to industry analysts. The Median Multiple provides an easily understood indicator of the structural health of residential markets and facilitates meaningful housing affordability comparisons, both between national and international markets and over time. Historically, most markets have exhibited Median Multiples of 3.0 or below.

The results of the existing house analysis follow (Figure 1, Figure 2 and Table 1):

Existing House Prices in Responsive Markets: Underlying market factors changed little between 1996 and 2006 in responsive markets. Overall house prices increased $11,000, which was within the $12,000 increase in the market ceiling for existing houses. The average structure replacement[8] cost rose from $109,000 in 1996 to $132,000 in 2006, an increase of 21 percent. The average structure replacement costs represented 77 percent of the median house price in 1996 and grew to 87 percent by 2006.

House prices remained within the market ceiling in both years. In 1996, the median house price averaged $141,000[9] in the responsive markets, which was 11 percent below the market ceiling. By 2006, the median house price had risen by 8 percent to $152,000, yet continued to be 11 percent below the market ceiling. The median house prices remained below the market ceiling in all four responsive markets. The average Median Multiple among responsive markets was 2.7 in 1996 and in 2006.

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[5] The median house price for 1996 and 2006 is obtained from the National Association of Realtors and the National Association of Home Builders. In each case, September data is used.

[6] Based upon an analysis of Joint Housing Center data (John F. Kennedy School of Government, Harvard University). The average Median Multiple was 2.5, which places the market ceiling at a Median Multiple of 3.0.

[7] *Promoting Sustainable Human Development,* United Nations, http://www.un.org/esa/sustdev/natlinfo/indicators/worklist.htm and http://esl.jrc.it/envind/un_meths/UN_ME050.htm and *Sectoral Indicators,* The World Bank, http://www.worldbank.org/html/opr/pmi/urban/urban006.html.

[8] Estimated from Calculated from geographical factors in *Means Residential Square Foot Costs: Contractor's Pricing Guide: 2007,* R. S. Means, 2007.

[9] All 1996 figures in 2006$.

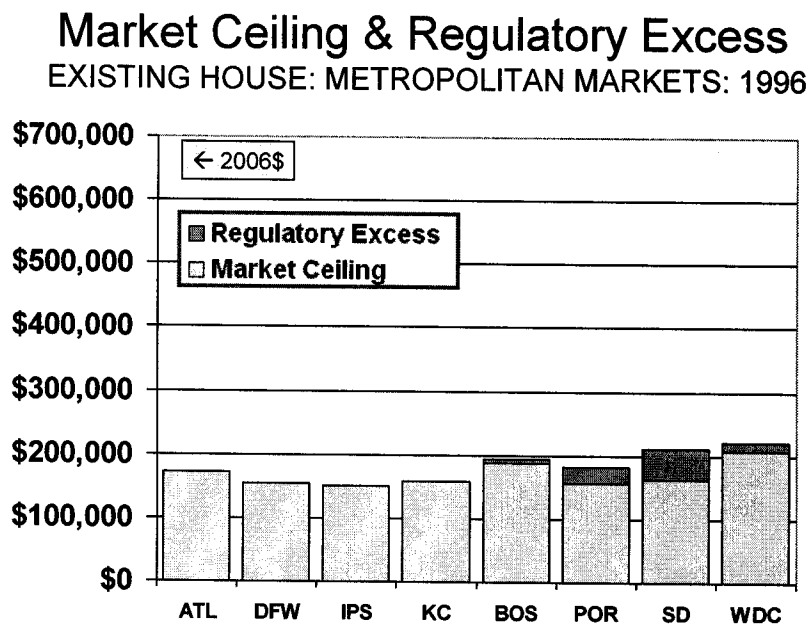

Figure 1

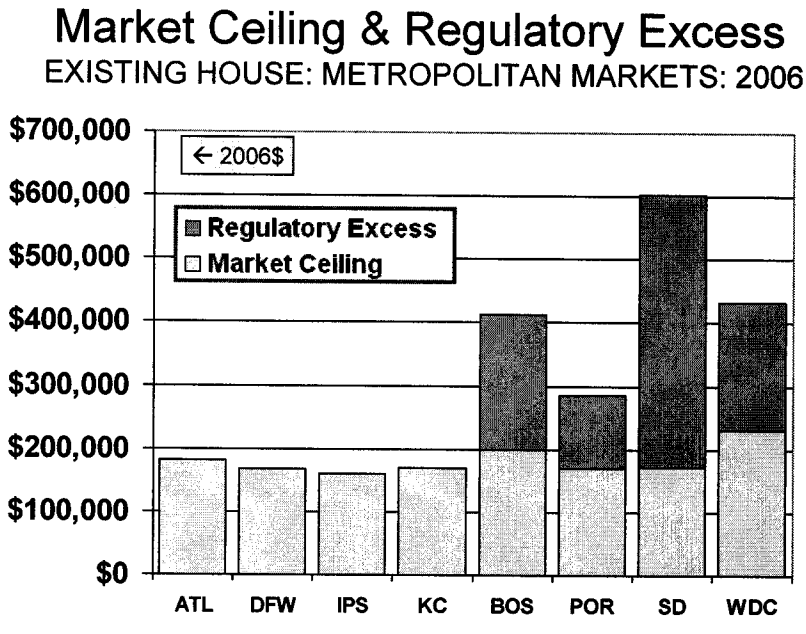

Figure 2

Atlanta: In 1996, the normal market ceiling for existing houses in Atlanta was $173,000. The market ceiling rose to $182,000 in 2006, an increase of 5 percent from 1996. The structure replacement cost rose from $107,000 to $140,000, an increase of 31 percent. As a result, house prices remained within the normal market ceiling. The median house price in 1996 was $150,000, or 13 percent below the 1996 market ceiling. By 2006, the median house price had risen to $176,000, which is 3 percent below the 2006 market ceiling. The Atlanta Median Multiple was 2.6 in 1996 and increased to 2.9 in 2006.

Dallas-Fort Worth: In 1996, the normal market ceiling for existing houses in Dallas-Fort Worth was $154,000. The market ceiling rose to $169,000 in 2006, an increase of 10 percent from 1996. The structure replacement cost rose from $103,000 to $117,000, an increase of 14 percent. Again, as a result, house prices remained within the normal market ceiling. The median house price in 1996 was $144,000, or 6 percent below the 1996 market ceiling. By 2006, the median house price had risen to $151,000, which is 11 percent below the 2006 market ceiling. The Dallas-Fort Worth Median Multiple was 2.8 in 1996 and declined to 2.7 in 2006.

Indianapolis: In 1996, the normal market ceiling for existing houses in Indianapolis was $150,000. The market ceiling rose to $160,000 in 2006, an increase of 7 percent from 1996. The structure replacement cost rose from $109,000 to $128,000, an increase of 17 percent. Again, as a result, house prices remained within the normal market ceiling. The median house price in 1996 was $150,000, equaling the 1996 market ceiling. By 2006, the median house price had fallen to $122,000, which is 24 percent below the 2006 market ceiling. The Indianapolis Median Multiple was 3.0 in 1996 and decreased to 2.3 in 2006.

Kansas City: In 1996, the normal market ceiling for existing houses in Kansas City was $150,000. The market ceiling rose to $160,000 in 2006, an increase of 7 percent from 1996. The structure replacement cost rose from $118,000 to $142,000, an increase of 20 percent. Again, as a result, house prices remained within the normal market ceiling. The median house price in 1996 was $121,000, which was 23 percent below the 1996 market ceiling. By 2006, the median house price had risen to $158,000, which is 7 percent below the 2006 market ceiling. The Kansas City Median Multiple was 2.3 in 1996 and increased to 2.8 in 2006.

Existing House Prices in Prescriptive Markets: As in responsive, markets, underlying market factors changed little between 1996 and 2006 in prescriptive markets, with the market ceiling for existing houses increasing $16,000. The average structure replacement cost rose from $130,000 in 1996 to $132,000 in 2006, an increase of 15 percent. The average structure replacement costs represented 64 percent of the median house price in 1996. By 2006, structure replacement costs had fallen nearly in half, to 35 percent, representing an inordinate increase in average land value.

However, unlike in the responsive markets, house prices escalated well above the levels justified by the underlying market factors. The average house price increase was $231,000, which is more than 14 times the increase in the market ceiling. In 1996, the median house price averaged $202,000 in the prescriptive markets, which was 11 percent above the market ceiling. By 2006, the median house price had risen by 114 percent to $432,000, to 124 percent above the market ceiling. The median house prices were above the market ceiling in all four prescriptive markets in both years. The average Median Multiple among prescriptive markets was 3.4 in 1996 and more than doubled, to 6.9 in 2006.

Boston: In 1996, the normal market ceiling for existing houses in Boston was $188,000. The market ceiling increased to $199,000 in 2006, an increase of 6 percent from 1996. The structure replacement cost rose from $141,000 to $164,000, an increase of 20 percent. However, house prices escalated strongly relative to the market ceiling. The median house price in 1996 was $194,000, which was 3 percent above the 1996 market ceiling. By 2006, the median house price had risen to $412,000, which is 107 percent above the 2006 market ceiling. The Boston Median Multiple was 3.1 in 1996 and doubled to 6.2 in 2006.

Portland: In 1996, the normal market ceiling for existing houses in Portland was $156,000. The market ceiling increased to $170,000 in 2006, an increase of 9 percent from 1996. The structure replacement cost rose from $126,000 to $140,000, an increase of 11 percent. However, house prices escalated strongly relative to the market ceiling. The median house price in 1996 was $182,000, which was 17 percent above the 1996 market ceiling. By 2006, the median house price had risen to $285,000, which is 68 percent above the 2006 market ceiling. The Portland Median Multiple was 3.5 in 1996 and increased to 5.0 in 2006.

San Diego: In 1996, the normal market ceiling for existing houses in San Diego was $163,000. The market ceiling increased to $172,000 in 2006, an increase of 6 percent from 1996. The structure replacement cost rose from $126,000 to $143,000, an increase of 13 percent. However, house prices escalated strongly relative to the market ceiling. The median house price in 1996 was $212,000, which was 30 percent above the 1996 market ceiling. By 2006, the median house price had risen to $602,000, which is 250 percent above the 2006 market ceiling. The San Diego Median Multiple was 3.9 in 1996 and nearly tripled to 10.5 in 2006.

Washington: In 1996, the normal market ceiling for existing houses in Washington was $207,000. The market ceiling increased to $230,000 in 2006, an increase of 6 percent from 1996. The structure replacement cost rose from $126,000 to $143,000, an increase of 11 percent. However, house prices escalated strongly relative to the market ceiling. The median house price in 1996 was $221,000, which was 7 percent above the 1996 market ceiling. By 2006, the median house price had risen to $432,000, which is 88 percent above the 2006

market ceiling. The Washington Median Multiple was 3.2 in 1996 and increased to 5.6 in 2006.

Regulatory Excess: As the information above shows, house prices in prescriptive markets escalated strongly relative to prices in responsive markets and relative to household incomes.

Median house prices in responsive markets were under the normal market ceilings, both in 1996 and 2006. As a result, there was no regulatory excess in either year.

Median house prices were somewhat above the normal market ceilings in 1996 in prescriptive markets. However, by 2006 the median house prices averaged $215,000 more than the normal market ceilings in the prescriptive markets. This represents a substantial regulatory excess that increased nearly 10 times, from a 1996 average of $25,000.

Regulatory excess accounted for 93 percent of the median house price increase in prescriptive markets from 1996 to 2006 (Figure 3). Non-smart growth market factors accounted for only 7 percent of the increase in prescriptive market median prices over those of responsive markets.

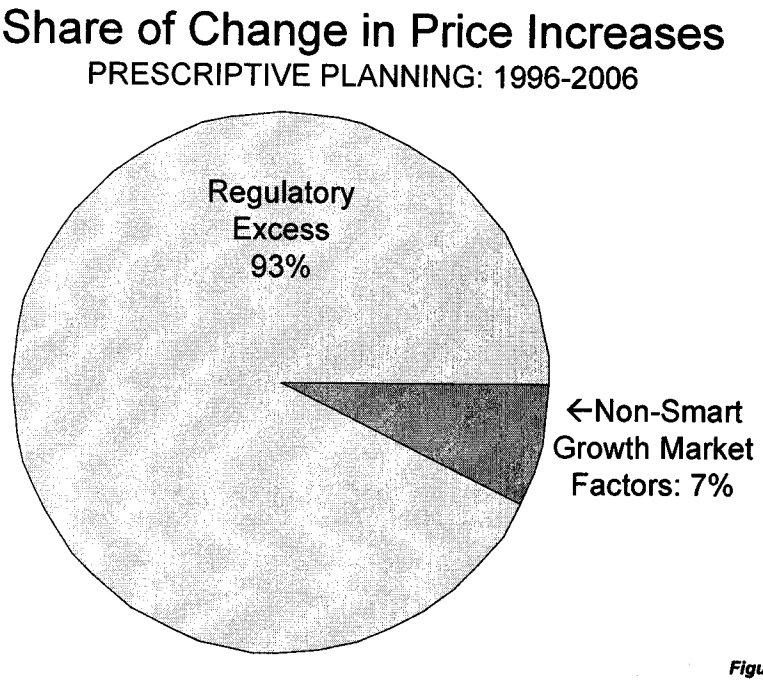

Figure 3

Inflation: Differences in inflation rates had nothing to do with the differences in house price increases between responsive and prescriptive markets. In fact, overall inflation was

greater in the responsive markets than in the prescriptive markets. This is indicated by the normal market ceiling, which rose 7 percent in responsive markets between 1996 and 2006 and only 5 percent in prescriptive markets.

Forecast and Reality: Moreover, the price contrasts with forecasts made by smart growth advocates. The *Costs of Sprawl---2000*[10] predicted that smart growth would reduce average new house costs $11,000 (inflation adjusted) per unit between 2000 and 2025 relative to areas with responsive planning policies.[11] At this rate, a reduction in costs of more than $3,000 per unit would have been expected between 2000 and 2006. To the contrary, median house prices rose more than $160,000 in prescriptive planning areas relative to prices in markets with responsive planning in just six years.

The Role of Demand: The cause of the price increase differences was not demand. Demand increased at a greater rate in the responsive metropolitan markets than in the prescriptive markets. This is the opposite of what would have been expected given the higher price increases in prescriptive markets. Population growth averaged 23 percent in the responsive markets from 1996 to 2006. Population growth was approximately one-half that rate in the prescriptive markets, at 12 percent.

Moreover, demand from more liberal loaning practices could not have been the cause of the differing house price increase experiences between responsive and prescriptive markets. The same financing arrangements were available in both responsive and prescriptive markets. If financing induced demand drove prices higher, similar experiences would have been expected in all markets. In fact, however, it appears that the responsive planning systems were able to accommodate the increased housing supply required by the new demand. The smart growth systems failed to permit the supply increase that would have been necessary to keep housing prices from escalating.

Conclusion: Existing Houses: There is no evidence of any inherent market differences that could account for the substantially higher existing house prices in smart growth markets compared to responsive markets. The data leads to a conclusion that smart growth is associated with higher existing house prices.

3. NEW HOUSES

The new house analysis uses a detached 1,600 square foot starter house on a 1/6th acre lot on urban fringe. The least expensive new house offered by a national or metropolitan

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[10] Robert W. Burchell, George Lowenstein, William R. Dolphin, Catherine C. Galley, Anthony Downs, Samuel Seskin, and Terry Moore, *Costs of Sprawl—2000*. Washington, DC: Transportation Research Board, 2002.

[11] The *Costs of Sprawl---2000* projection related to new housing. This analysis refers to existing housing, which typically exhibits similar cost increase trends and is closely related to the price of new housing. In 2006, the new starter house price (below) represented approximately 85 percent of the median house price in the reviewed responsive markets and 90 percent in the prescriptive markets. Thus, the increase in existing house prices is associated with similar increases in new house prices.

builder, on the urban fringe was selected in each metropolitan market.[12] The normal market ceiling is estimated at 20 percent above the normal production cost[13] in a non-smart growth market. This includes the land purchase, infrastructure and construction of the house. As in the case of existing houses, any actual house price above the normal market limit is considered a *regulatory* excess.

The new house analysis results follow (Table 2)

Responsive Markets: New house prices were below the normal market limit in responsive markets. The normal market ceiling for new houses in responsive markets averaged $173,000. The actual new house price averaged $132,000, which is 24 percent below the market ceiling. The actual house price was below the market ceiling in each of the responsive markets. The cost of house construction represented 89 percent of the actual purchase price of the house (and land). Moreover, the actual house price averaged below the normal production cost. This illustrates the role of competition in relatively unconstrained markets as builders and developers seek buyers by reducing costs and profit margins (Figure 4).

> **Atlanta:** The normal market ceiling for new houses in Atlanta was $173,000. The actual new house price in Atlanta was $135,000, which is 22 percent below the market ceiling.
>
> **Dallas-Fort Worth:** The normal market ceiling for new houses in Dallas-Fort Worth was $152,000. The actual new house price in Dallas-Fort Worth was $104,000, which is 32 percent below the market ceiling.
>
> **Indianapolis:** The normal market ceiling for new houses in Indianapolis was $173,000. The actual new house price in Indianapolis was $126,000, which is 27 percent below the market ceiling.
>
> **Kansas City:** The normal market ceiling for new houses in Kansas City was $193,000. The actual new house price in Kansas City was $163,000, which is 16 percent below the market ceiling.

Prescriptive Markets: New house prices were above the normal market limit in prescriptive markets. The normal market ceiling for new houses in prescriptive markets averaged $201,000. The actual new house price averaged $369,000, which is 84 percent above the market ceiling. Unlike the responsive markets, the actual house price was above the market ceiling in each of the prescriptive markets. The cost of house construction represented 36 percent of the actual purchase price of the house (and land),

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[12] The urban fringe was selected, since most new housing has been built on greenfield land on the edge of American urban areas for decades (even before World War II).

[13] The normal production cost includes the cost of agricultural land on the fringe (estimated from US Department of Agriculture data for the fringe county, a premium for conversion to residential use, lot finishing and infrastructure costs and the cost of house construction).

well below the 89 percent in the responsive markets. Moreover, the actual house price averaged well above ($201,000) the normal production cost.

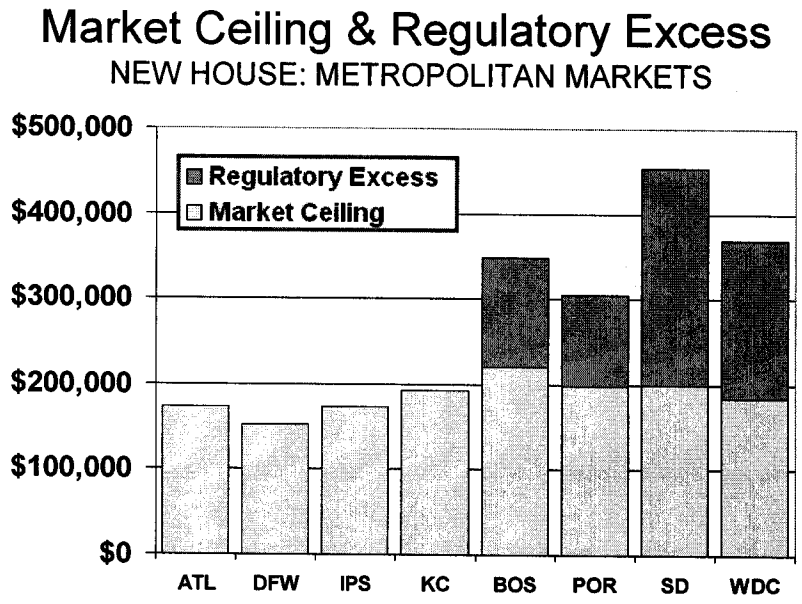

Figure 4

Boston: The normal market ceiling for new houses in Boston was $221,000. The actual new house price in Boston was $348,000, which is 57 percent above the market ceiling.

Portland: The normal market ceiling for new houses in Portland was $198,000. The actual new house price in Portland was $304,000, which is 54 percent above the market ceiling.

San Diego: The normal market ceiling for new houses in San Diego was $200,000. The actual new house price in San Diego was $454,000, which is 127 percent above the market ceiling.

Washington: The normal market ceiling for new houses in Washington was $201,000. The actual new house price in Washington was $369,000, which is 84 percent above the market ceiling.

Regulatory Excess: As in the case of existing houses, no regulatory excess is identified in responsive markets. Actual new house price is below the normal market ceiling for new houses. There are, however, substantial regulatory excesses in the prescriptive markets. Actual new house prices are well above the normal market ceiling, with an average regulatory excess of $169,000.

Conclusion: New Houses: There is no indication that the higher prices or more rapid price increases of houses in prescriptive markets is due to any normal market factor (non-smart growth factor). The differences in agricultural land, lot finishing and construction costs are far too small to justify the higher prices evident in prescriptive markets. The data leads to a conclusion that smart growth is associated with higher new house prices.

4. CONCLUSION: SMART GROWTH & HOUSE PRICES

The higher prices and steeper house price increases in prescriptive markets (smart growth markets) are consistent with the economic view that more restrictive land use regulation leads to higher house prices. It seems likely that the principal cause of these higher prices is land use restrictions that drive the price of land higher (Figure 5).

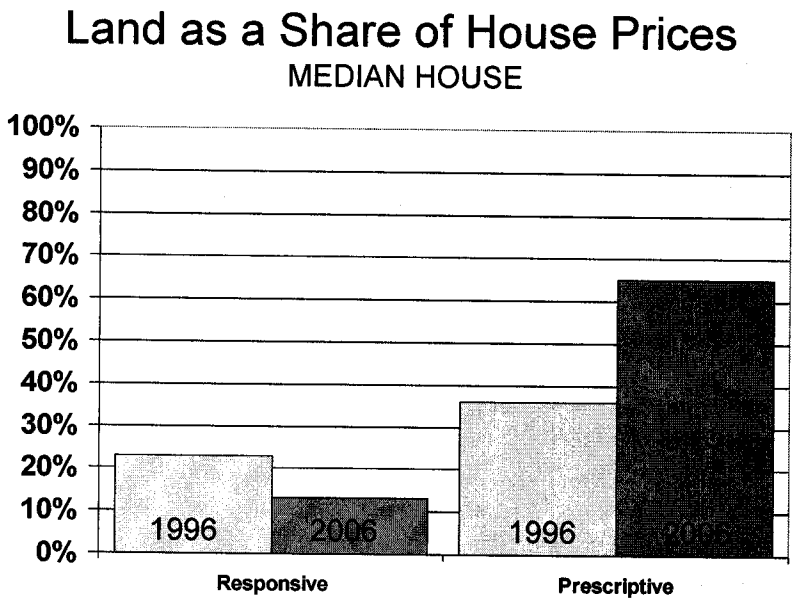

Figure 5

Thus, since house prices are materially higher than can be explained by normal market fluctuations in prescriptive markets, ***it is concluded that smart growth increases housing prices.*** Moreover, the extent to which smart growth elevates housing prices is considered material and could lead to serious negative consequences, which are outlined in the next section.

5. IMPLICATIONS OF HIGHER SMART GROWTH HOUSING PRICES

The substantially higher costs of housing in prescriptive markets are likely to have significant negative impacts on household budgets and, as a result, the quality of life.

Smart Growth and Household Budgets: The impact on household budgets varies widely by metropolitan market. In 1996, mortgage payments on the median priced

equaled 18 percent of median household income in the responsive markets. This figure was unchanged in 2006. In the four prescriptive markets, the share of the median household income taken by mortgage payments on the median priced house doubled over the same period, from 23 percent to 46 percent (Figure 6). In the case of San Diego, the median house mortgage share of median household income rose from 26 percent to 70 percent over the 10 years.

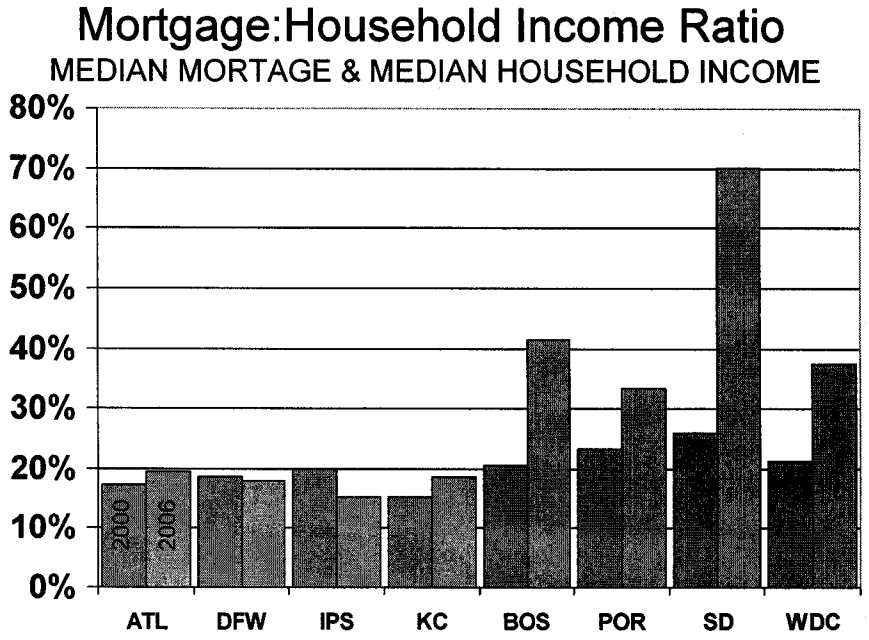

Figure 6

Middle-income households will be increasingly less able to afford today's median house prices. Future households may have to accept less value in housing. For example, new house sizes are already declining in Portland.[14] The alternative is for households to spend less on other goods, because of the huge increase in housing costs. It is moreover likely that many households that would formerly have been able to afford to buy a house will not be able to in the future. Each of these eventualities translates into deterioration in the quality of life. Moreover, any reduction in home ownership or the quality of life is likely to lead to a wider income disparity between higher and lower income households.

Smart Growth and First Home Buyers: In the longer run, smart growth's higher house prices relative to incomes will make it more difficult for many households to purchase their first homes. This is indicated by the Quartile Multiple, which is an indicator of "first home buyer" or lower income housing affordability. The Quartile Multiple measures the number of years of income it takes for the quartile (25^{th} percentile) income household to pay for the quartile priced house. The Quartile Multiple measures the number of years of

[14] Sonny Conder and Karen Larson, Metro Single Family Home Price Trends: Donuts Without Holes and Turnips Without Blood, Portland: Metropolitan Regional Government; http://www.metro-region.org/library_docs/maps_data/sfrpricestudy1999_2000.pdf.

income it takes for the quartile (25th percentile) income household to pay for the quartile priced house. The Quartile Multiple averages 1.4 years more than the Median Multiple in responsive markets. In prescriptive markets, the Quartile Multiple is 5.9 years more than the Median Multiple (Figure 7).[15]

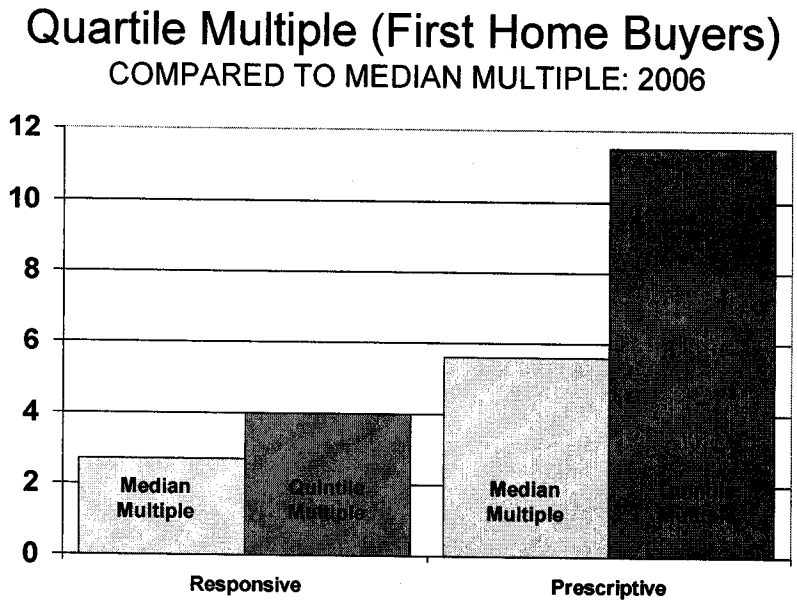

Figure 7

Smart Growth and Ethnic Minorities: Perhaps none of the negative consequences of smart growth is more obvious than its impact on ethnic minorities. For decades, the nation has sought to bring ethnic minorities, particularly African-Americans and Hispanics into the mainstream of society. This requires strategies that increase incomes, which necessarily requires increasing home ownership, a principal mechanism of middle and lower income wealth creation.

Home ownership rates among African-Americans and Hispanics remain a full third below that of white-non-Hispanic. Generally, African-Americans and Hispanics have lower incomes than white-non-Hispanics. A Tomas Rivera Policy Institute report cited prescriptive land use policies as a principal barrier to Hispanic home ownership in California.[16] The higher relative cost of housing for ethnic minorities is indicated in the reviewed markets (Figure 8)

> In the four responsive markets Hispanic households pay 1.6 years more in median income for the median priced house than White-Non-Hispanics. African-

[15] http://www.demographia.com/db-quartilemult.pdf.
[16] Waldo Lopez-Aqueres, Joelle Skaga, and Tadeusz Kugler (2002). *Housing California's Latino Population in the 21st Century: The Challenge Ahead.* Los Angeles, CA: The Tomas Rivera Policy Institute. Pp. 23-30

Americans require 1.8 years more in median household income to pay for the median priced house.

In the four smart growth markets Hispanic households pay 4.0 years more in median income for the median priced house than White-Non-Hispanics. African-Americans require 4.4 years more in median household income to pay for the median priced house. Compared to responsive markets, Hispanic households pay 7.4 more years in median household income for the median priced house, while African-Americans pay 8.3 years more in median income.

Moreover, as housing affordability is lost, the losses in economic opportunity are likely to be disproportionately experienced by ethnic minorities because of their generally lower incomes. It is further likely that the gap between minority and White-Non-Hispanic home ownership will increase.

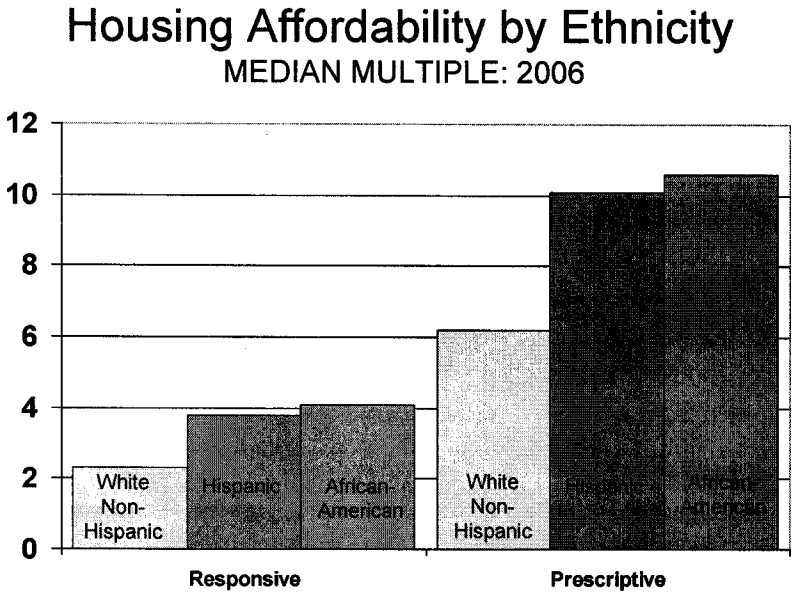

Figure 8

Impact on Metropolitan Economies: Research indicates that prescriptive land-use regulations lead to lower levels of economic growth. A paper by Raven Saks of the Federal Reserve Board concluded, "metropolitan areas with stringent development regulations generate less employment growth than expected given their industrial bases"[17] It can be expected that reduced economic growth will lead to comparative poverty levels that are higher.

[17] Raven E. Saks, *Job Creation and Housing Construction: Constraints on Metropolitan Area Employment Growth*, http://www.federalreserve.gov/pubs/feds/2005/200549/200549pap.pdf.

Migration: The household economic disruption caused by higher housing prices is already evident in domestic migration trends, as households leave more expensive areas for less expensive areas.[18]

While the responsive and prescriptive planning markets have nearly the same total population, the domestic migration patterns are radically different. Overall, the four responsive planning markets gained more than 500,000 domestic migrants between 2000 and 2006. At the same time, there was a net loss of 400,000 domestic migrants in the prescriptive planning markets. San Diego, which has been one of the nation's fastest growing metropolitan areas for more than one-half century is now losing domestic migrants at a rate greater than the Rust Belt metropolitan areas of Pittsburgh, and Buffalo and at a rate equal to those of Cleveland and Detroit.[19]

Relocation Bonus: House prices in the prescriptive markets have risen so strongly, that a significant *relocation bonus* can be earned by households moving to responsive markets. On average moving from one of the four prescriptive markets to one of the four responsive markets will reduce median house purchase and financing costs by nearly $650,000 (and as high as $1,000,000). This is the equivalent of 11 years of median household income, or one-quarter of a 40-year work career for the household (Tables 3 and 4).[20]

By comparison, in 1996, the average relocation bonus would have been $140,000, which was the equivalent of 2.7 years of median household income.[21] The more than three times increase in housing costs in the more expensive (prescriptive) markets is unprecedented.

Moving from prescriptive markets to responsive markets result in the following relocation bonuses, based upon median house prices in 2006:

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[18] A similar trend is evident: prescriptive planning markets tend to lose domestic migrants, while responsive planning markets are gaining domestic migrants. The most expensive prescriptive planning markets lost nearly 4,000,000 residents to other parts of the country between 2000 and 2006. However, a number of prescriptive planning markets gained (referred to as "safety valve" markets), apparently because their principal sources of domestic migration had far worse housing affordability (such as Portland, which gains domestic migrants from California). The more affordable large markets, all without prescriptive planning, gained more than 700,000 domestic migrants. In perhaps the most significant turnaround, the nation's smaller urban and rural area gained more than 1.9 million domestic migrants as the nation accelerated its historic decentralization. Generally, the smaller markets have less prescriptive planning policies.

[19] See: http://www.demographia.com/db-msamigra-ann.pdf, *Net Internal Migration by MSA: Total and Annual: 2000-2006.*

[20] This does not include the impact of the federal income tax mortgage deduction, which would reduce the relocation bonus. On the other hand, some or all of this reduction would be nullified by the higher cost of living in each of the prescriptive markets compared to the responsive markets (based upon an analysis of ACCRA cost of living data).

[21] Based upon the difference in financing the median priced house at a 6.5 percent annual percentage rate, with a 30-year fixed rate mortgage. Down payment assumed to equal 10 percent of the national average median priced house.

Atlanta: A move from a prescriptive market to Atlanta would result in an average relocation bonus of approximately $590,000, or 9.7 years of median household income. This ranges from a $250,000 bonus (4.1 years of median household income) for a move from Portland to a $980,000 bonus (16.2 years) for a move from San Diego.

Dallas-Fort Worth: A move from a prescriptive market to Dallas-Fort Worth would result in an average relocation bonus of approximately $650,000, or 11.5 years of median household income. This ranges from a $310,000 bonus (15.5 years of median household income) for a move from Portland to a $1,040,000 bonus (18.4 years) for a move from San Diego.

Indianapolis: A move from a prescriptive market to Indianapolis would result in an average relocation bonus of approximately $650,000, or 13.4 years of median household income. This ranges from a $370,000 bonus (7.0 years of median household income) for a move from Portland to a $1,100,000 bonus (20.7 years) for a move from San Diego.

Kansas City: A move from a prescriptive market to Kansas City would result in an average relocation bonus of approximately $630,000, or 11.2 years of median household income. This ranges from a $370,000 bonus (5.4 years of median household income) for a move from Portland to a $1,100,000 bonus (18.3 years) for a move from San Diego.

Conclusion: Achieving the goals of prescriptive planning may not be possible without destroying housing affordability. For example, an urban growth boundary is likely to increase the price of land (and housing), unless it is drawn so far from the urban footprint that it has no serious impact on land prices. Despite the qualified claims of smart growth proponents, it is clear that smart growth materially raises housing prices. This is consistent with economic theory and the views of the economists cited above.

This dilemma has led Donald Brash, former governor of the Reserve Bank of New Zealand has gone so far as to suggest that urban growth boundaries be prohibited due to their negative impacts.

> ... *Metropolitan Urban Limits and similar restrictions should simply be outlawed, no ifs or buts.* [22]

[22] http://www.fcpp.org/main/publication_detail.php?PubID=1899.

Table 1
Existing House Analysis Information

1996	A	B	C	D	E
Metropolitan Market	Structure Replacement Value	Median House Price	Normal Market Ceiling	Median House Price/Market Ceiling	Regulatory Excess (B-C)
RESPONSIVE MARKETS	**$109,000**	**$141,000**	**$158,000**	**-11%**	**None**
Atlanta	$107,000	$150,000	$173,000	-13%	None
Dallas-Fort Worth	$103,000	$144,000	$154,000	-6%	None
Indianapolis	$109,000	$150,000	$150,000	0%	None
Kansas City	$118,000	$121,000	$158,000	-23%	None
PRESCRIPTIVE MARKETS	**$130,000**	**$202,000**	**$177,000**	**14%**	**$25,000**
Boston	$141,000	$194,000	$188,000	3%	$6,000
Portland	$126,000	$182,000	$156,000	17%	$26,000
San Diego	$126,000	$212,000	$163,000	30%	$49,000
Washington	$126,000	$221,000	$207,000	7%	$14,000
Difference	**$21,000**	**$61,000**	**$19,000**		**$25,000**
Percentage	19.3%	43.3%	12.0%		
2006					
Metropolitan Market	Structure Replacement Value	Median House Price	Normal Market Ceiling	Median House Price/Market Ceiling	Regulatory Excess (B-C)
RESPONSIVE MARKETS	**$132,000**	**$152,000**	**$170,000**	**-11%**	**None**
Atlanta	$140,000	$176,000	$182,000	-3%	None
Dallas-Fort Worth	$117,000	$151,000	$169,000	-11%	None
Indianapolis	$128,000	$122,000	$160,000	-24%	None
Kansas City	$142,000	$158,000	$170,000	-7%	None
PRESCRIPTIVE MARKETS	**$150,000**	**$433,000**	**$193,000**	**124%**	**$240,000**
Boston	$164,000	$412,000	$199,000	107%	$213,000
Portland	$140,000	$285,000	$170,000	68%	$115,000
San Diego	$143,000	$602,000	$172,000	250%	$430,000
Washington	$153,000	$432,000	$230,000	88%	$202,000
Difference	**$18,000**	**$281,000**	**$23,000**		**$240,000**
Percentage	13.6%	184.9%	13.5%		
Change: 1996-2006					
Metropolitan Market	Structure Replacement Value	Median House Price	Normal Market Ceiling		Regulatory Excess (B-C)
RESPONSIVE MARKETS	**$23,000**	**$11,000**	**$12,000**		**None**
Atlanta	$33,000	$26,000	$9,000		None
Dallas-Fort Worth	$14,000	$7,000	$15,000		None
Indianapolis	$19,000	($28,000)	$10,000		None
Kansas City	$24,000	$37,000	$12,000		None
PRESCRIPTIVE MARKETS	**$20,000**	**$231,000**	**$16,000**		**$215,000**
Boston	$23,000	$218,000	$11,000		$207,000
Portland	$14,000	$103,000	$14,000		$89,000
San Diego	$17,000	$390,000	$9,000		$381,000
Washington	$27,000	$211,000	$23,000		$188,000
Difference	**($3,000)**	**$220,000**	**$4,000**		**$215,000**
Percentage	-113.0%	1900.0%	-66.7%		

Table 2
New House Analysis Information

Metropolitan Market	A Exhibit: Raw Land Cost	B Land Sale Price	C Site Preparation Cost	D Finished Lot Cost (B+C)	E Construction Cost	F Normal Production Cost (D+E)	G Actual New House Price	H Normal Market Limit	I House Price/Market Ceiling	J Regulatory Excess (H-I)
RESPONSIVE MARKETS	**$800**	**$4,000**	**$22,000**	**$26,000**	**$118,000**	**$144,000**	**$132,000**	**$173,000**	**-24%**	**None**
Atlanta	$1,200	$6,000	$22,000	$28,000	$116,000	$144,000	$135,000	$173,000	-22%	None
Dallas-Fort Worth	$500	$2,000	$20,000	$22,000	$105,000	$127,000	$104,000	$152,000	-32%	None
Indianapolis	$900	$5,000	$22,000	$27,000	$117,000	$144,000	$126,000	$173,000	-27%	None
Kansas City	$800	$4,000	$25,000	$29,000	$132,000	$161,000	$163,000	$193,000	-16%	None
PRESCRIPTIVE MARKETS	**$1,900**	**$10,000**	**$25,000**	**$35,000**	**$133,000**	**$168,000**	**$369,000**	**$201,000**	**84%**	**$168,000**
Boston	$2,600	$13,000	$27,000	$40,000	$144,000	$184,000	$348,000	$221,000	57%	$127,000
Portland	$1,900	$10,000	$24,000	$34,000	$131,000	$165,000	$304,000	$198,000	54%	$106,000
San Diego	$1,700	$8,000	$25,000	$33,000	$134,000	$167,000	$454,000	$200,000	127%	$254,000
Washington	$1,500	$8,000	$23,000	$31,000	$122,000	$153,000	$369,000	$184,000	101%	$185,000
Difference	**$1,100**	**$6,000**	**$3,000**	**$9,000**	**$15,000**	**$24,000**	**$237,000**	**$28,000**		**$168,000**
Percentage	137.5%	150.0%	13.6%	34.6%	12.7%	16.7%	179.5%	16.2%		

Table 3
Relocation Bonus: Move from Prescriptive to Responsive Markets
RESPONSIVE MARKETS

Move From/To--> PRESCRIPTIVE MARKETS	Atlanta	Dallas-Fort Worth	Indianapolis	Kansas City	Average
Boston	$540,000	$600,000	$670,000	$580,000	$598,000
Portland	$250,000	$310,000	$370,000	$290,000	$305,000
San Diego	$980,000	$1,040,000	$1,100,000	$1,020,000	$1,035,000
Washington	$590,000	$650,000	$710,000	$630,000	$645,000
Average	$590,000	$650,000	$713,000	$630,000	$646,000

Table 4
Relocation Bonus: Move from Prescriptive to Responsive Markets: In Years of Median Household Income
RESPONSIVE MARKETS

Move From/To--> PRESCRIPTIVE MARKETS	Atlanta	Dallas-Fort Worth	Indianapolis	Kansas City	Average
Boston	9.0	10.7	12.5	10.3	10.6
Portland	4.1	5.5	7.0	5.2	5.4
San Diego	16.2	18.4	20.7	18.0	18.3
Washington	9.7	11.5	13.3	11.1	11.4
Average	9.7	11.5	13.4	11.2	11.0

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POLICY NOTE

The Cost of Smart Growth in Transportation Planning

A summary of Washington Policy Center's 2012 Transportation Lunch

by Kathlyn Ehl
Research Assistant

June 2012

Presenters

Craig Stone, director, Washington State Department of Transportation Toll Division

Wendell Cox, transportation policy expert and principal, Demographia

In May, Washington Policy Center welcomed over 200 transportation experts, business leaders, community members, news reporters, and dozens of state and elected officials to its 2012 Annual Transportation Lunch event in Bellevue.

Attendees first heard from Craig Stone, director of Washington State Department of Transportation's Toll Division, on the State Route 520 tolling project and its performance and effect on driver behavior since tolling began last year.

Guests then enjoyed a keynote presentation by transportation policy expert Wendell Cox. "Cities exist because of economic opportunities," Cox said. "The purpose of urban areas is to improve the affluence of their residents." Mr. Cox provided the audience with an overview of smart growth policies, such as those used in the Puget Sound region, and explained the detrimental effects they can have on traffic congestion, housing prices, development patterns and demographics throughout the state.

Mr. Stone began with a basic description of the SR-520 bridge program, which will replace the current Evergreen Point floating bridge that opened in 1963. The project will also make improvements to landings, interchanges and roadways between I-5 in Seattle and the eastern shore of Lake Washington. He also pointed out the program includes Sound Transit and HOV improvement projects from Medina to Redmond and congestion management features from I-5 to I-405.

Mr. Stone explained that Seattle was one of five urban areas to receive $154.4 million in federal grant money from the United States Department of Transportation (USDOT) to improve and research better transportation methods. The grant money is assisting Washington in implementing the Congestion Management Program, specifically variable tolling across the floating bridge. Stone stated that tolling 520 "is the facility that we're using to generate revenue to pay for improvements for a bridge that is 50 years old and in need of replacement." He went on to say that it was never a question of whether or not to toll, but rather "came down to a question of how it should be tolled."

Components of the project include advanced technology such as electronic travel time signs directing drivers to the best route, variable speed limits and real-time driver information. Additionally, Sound Transit and King County added more than 130 bus trips across the bridge daily, and have encouraged vanpool and carpool programs. Mr. Stone said since tolling began, buses have had a 10% ridership increase and vanpools in the SR-520 corridor have increased nearly 17%.

Tolling on SR-520 is an open-road system, variably priced and all electronic. This system, he explained, allows drivers to maintain travel speeds throughout the corridor and better manages pricing points at peak times. Tolls are collected from drivers traveling in both directions through two methods: Good To Go accounts or through a photo toll which sends a bill to the driver through the mail. Stone said that $1 billion of the $2.4 billion currently being spent is coming from tolls, and "that is our target for moving forward."

He said Good To Go accounts are the most efficient model both for drivers and for collection purposes. Initial targets were to open 100,000 new accounts before tolling began, but Mr. Stone was excited to announce WSDOT exceeded its goal by opening 250,000 new accounts. Transportation officials forecast 72% of transactions in the first year would be through these accounts, but early indications show approximately 80% of all toll trips are made by Good To Go account users. Stone said that numbers like this are what other tolling projects across the world strive to achieve, and that this shows great success of the program from very early on. "If we can get people into the lowest cost collection, the Good to Go," he said, "it helps everybody."

Individuals without a Good To Go pass are billed by mail and are charged a higher fee of $1.50 more. A photo of the license plate is taken and bills are mailed to the owner of the car. He also noted there is a short-term account available for drivers who are from out of the area.

Mr. Stone explained the project's variable price rates, which he stated were originally controversial and confusing, but now "people are getting it." There are no tolls from 11:00 p.m. to 5:00 a.m., and four rates throughout the day, which alternate at certain times. He explained that without this variability, the cost would be overpriced during non-peak travel hours, deterring drivers elsewhere, and underpriced during rush hour, creating congestion. A flat toll rate, as an alternative option, as is used in Vancouver, B.C., would need to be 20 cents more than the average $2.60 rate people are currently paying. He said this would be necessary because 10% of trips across the bridge would be lost to other routes. Variable rates have proven successful in reducing congestion and minimizing cost to the driver, as well as maximizing revenue for the state.

Mr. Stone told the audience he understands this is a "critically important corridor to us all," and explained what this "massive project" has meant for drivers. Initial results for the first four months of operations show very positive performance, he said. Traffic levels on the toll bridge have met or exceeded projections by as much as 9% on weekdays and by as much as 32% on weekends. Driver volumes on the bridge are actually exceeding the pre-toll average during peak travel times. Traffic levels on I-90, a major focus of concern in the community, have increased 5 to 10% and the commute is generally only two or three minutes longer during peak travel times. Traffic on both I-5 (between Seattle and Northgate) and I-405 (through Bellevue) is within two percent of what it was before tolling, and travel times are two or three minutes slower in both directions, on average.

Since "tolling is a business," as Stone put it, looking at revenue streams is very important in indicating success. Revenue from tolls has exceeded expectations according to preliminary data from the department of transportation. In March, gross revenue was as much as 9% above the forecasted numbers, and when adjusted for free trip incentives and faulty or doubtful charges, revenue was much as 23% above forecasts.

Questions from the audience focused on the broader economic and policy implications of tolling, including fairness, about which Stone provided more information. He explained that it costs the state about ten cents on the dollar to collect the toll, and about three quarters of that is used to pay companies that

provide cameras and other necessary components. On the question of fairness, he replied, "There is a cost to driving; there is a cost to tolls," and "we know that some people are staying on their side of the lake."

Concluding his update on Washington's tolling efforts, Stone reminded the audience, "We're only in the first few months of this," but that so far, "Things are settling down, customers are getting used to the system. We're trying to build bridges and infrastructure with that [tolling] revenue." He added, "We're trying to bring this into the 21st century."

Next, Michael Ennis, director of WPC's Center for Transportation, introduced the luncheon's keynote speaker Wendell Cox.

As the principal of Wendell Cox Consultancy (Demographia), an international public policy firm, Mr. Cox specializes in urban policy, transport and demographics. He has provided consulting assistance to the United States Department of Transportation and was certified by the Urban Mass Transportation Administration as an "expert" for the duration of its Public-Private Transportation Network program (1986–1993). He has consulted for public authorities in the United States, Canada, Australia and New Zealand, and for public policy organizations. He serves as visiting professor at the Conservatoire National des Arts et Metiers (a national university) in Paris, where he lectures on transport and demographics.

Most recently he was tasked with preparing a policy report for the congressional Millennial Housing Commission about smart growth and housing affordability. He lectures widely, writes numerous commentaries and is frequently interviewed by international, national and local media.

"You go pushing things too much," said Mr. Cox, "and all of a sudden it will be more than the Supersonics moving to Oklahoma City."

"Cities are justified only by economics," he began. "Urban areas exist because of the economic opportunities they provide." A well-governed and planned area will provide positive economic growth, easy access to jobs, and mobility around the area, all at a low, affordable cost of living. Cox's speech focused on the "smart growth" policies in Washington and the Seattle metropolitan area, which have regulated land use and managed growth of the area. These policies, for example, create centralized transit centers, seek to reduce the amount and distance that people drive their cars, and promote policies that sustain the environment.

However, Cox was critical of these policies, explaining that, "We have allowed architects and planners to hijack city policies without considering the cost." He said that when planning, nobody looks at the negative effects these policies have on the economy. While looking at smart growth debates around the country, nobody considers the impacts on housing costs, mobility and the factors which ultimately create jobs and sustain the economy. "We need to do this," he insisted.

Mobility has made large urban areas possible, Cox explained, and it is "the key to metropolitan job growth." In the past 35 years, virtually all urban growth has been in the suburbs. Locally, 76.3% of Seattle's metropolitan growth since 2000 has been in suburban areas, specifically Pierce, Snohomish and Kitsap counties. These counties have seen a significant increase in employment over the past 12 years, while King County has actually experienced negative growth.

The reason for these trends, Cox postulated, is because increased mobility has continued to make it "possible for people to get further, cities to get larger, and for labor markets to be more efficient."

While smart growth policies try to reduce the time and distance people drive, they can have a detrimental effect on job growth. "Forcing people out of their cars does not improve productivity," said Cox. A less mobile metropolitan area will have less economic growth.

Further, Cox explained that transit is not a viable alternative for the majority of people who need to get to work and move about the city whenever they want. Transit generally is not faster than driving a car, Cox said, and only 6.7% of people can get to work through public transportation in less than 45 minutes. When you increase the distance one is able to travel to work in a set period of time, Cox explained, the better the economic growth will be.

He did concede that for people traveling to the core of downtown Seattle, transit can be a good option but "it cannot get you anywhere else." 87% of jobs are outside of downtown Seattle, but the city accounts for about 60% of transit ridership. Again, he emphasized that forcing people out of their cars and into public transportation is not going to improve job growth, personal mobility or affluence in the Seattle metropolitan area.

Cox dismissed one specific argument in favor of transit, regarding low-income people and the assumption that they have a heavy reliance on public transportation. He showed that 73% of low-income residents in the Seattle area get to work by car. Car ownership is simply, "the best way to get low-income people to work," especially outside of downtown. Because downtown Seattle represents only 13% of jobs in the greater metropolitan area, Cox explained public transportation cannot be a substitute for most low-income individuals to get to work.

Cox explained that Washington state's Growth Management Act has set a goal of regulating housing production and supply, effectively managing the amount of growth and land use to certain areas. He said there are many negative effects associated with these policies, including high housing prices, increased poverty and less economic growth.

Cox quoted Don Brash, the governor of the New Zealand Bank, who said, "The affordability of housing is overwhelmingly a function of just one thing: The extent to which governments place artificial restrictions on the supply of residential land."

Cox summarized that when planners in Seattle regulate the use of land, restricting supply, prices go up. "It's a very basic economic issue."

One idea policymakers and planners have used to combat this, Cox explained, has been to create transit-oriented centers, in effect "balkanizing the city." The state builds transit centers, encouraging people to ride transit or live in a location where they can walk to work. He suggested this is a "counterproductive kind of program" which would "destroy the very purpose of the urban area" and bring us back to what urban centers looked like before the 19th century.

Another problem Cox highlighted about smart growth is the environmental analysis which he argues is incorrect: "There is no reason why we cannot have a sustainable environment and at the same time, continue to have good lives."

Washington state has created benchmarks for reducing Vehicle Miles Traveled (VMT) to cut greenhouse emissions. He suggested a better approach would be to reduce congestion conditions because "a five-mile trip in congested conditions emits the same amount of greenhouse gas emissions as a nine-mile trip in less congested areas." Thus, it won't do any good if the total miles traveled are reduced at a cost of increased congestion and reduced speeds. "What it will not do is get the greenhouse reductions we have hoped for," he said.

Overall, Cox wanted the audience to understand that a well-governed city is one in which government officials, policymakers and citizens are concerned about indicators such as the cost of living, access to the labor market and sustainable economic growth.

Most importantly, he said, we have choices. Smart growth has significant costs: If we reduce vehicle miles traveled, we are going to hinder job growth; if we restrict the supply of housing, we are going to create a higher cost of living; and if we combine these efforts, we're going to increase poverty and hurt the overall economy. On the other hand, Cox said, is a situation where people have choices: "Nobody is forced to live in Seattle."

The good news is that regardless of the poor choices city planners around the country are making, and the choices people are being forced to make about living and working conditions, "We are now, I hope, embarking on the long-needed debate on this issue." He said that there is a lot to be considered about smart growth and how it can impact economic growth in Seattle, but "I'm just hopeful that in the long run that we will see this debate grow. I don't know what the outcome will be, but these are issues enough to at least be debated objectively."

Visit washingtonpolicy.org to watch video of the entire conference.

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Executive Summary
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The Costs of Sprawl Reconsidered: What the Data Actually Show

Wendell Cox and Joshua Utt

The Costs of Sprawl? The "anti-sprawl" movement has received much attention in recent years, and has been successful in implementing its "smart growth" policies in some areas. Much of the justification for the current campaign against the low-density (sprawling) urban development that Americans and Western Europeans prefer is based upon assumptions that it is more costly than the more dense development of central cities. A federally financed research project (*Costs of Sprawl*) concluded that we can no longer afford sprawling development and that failure to force more dense development in the next quarter-century would impose more than $225 billion in additional costs.

Current Urban Planning Assumptions. The urban planning profession generally contends that the following assumptions (called in this paper Current Urban Planning Assumptions) are compelling reasons why greater control should be exercised over land use to fight urban sprawl.

1. Lower spending will be associated with *higher* population densities.
2. Lower spending will be associated with *lower* rates of population growth.
3. Lower spending will be associated with *older* municipalities.

Research to Date. Most of the research on which these assumptions are based is theoretical, projecting standard costs into the future. It makes no attempt to test the actual expenditures of more dense, slower growing, and older municipalities compared to municipalities with the suburban land-use patterns that have developed over the past half-century. The research contained in this paper examines the actual data on municipal expenditures and finds that the Current Urban Planning Assumptions are unreliable and that other factors—principally, variations in employee compensation per capita—explain virtually all of the variation in municipal expenditures.

However, before describing this research, it is important to examine the *Costs of Sprawl* claims. Although $225 billion in additional costs sounds like a lot (and there are many questions regarding this claim), the cost is actually modest because it is spread over a quarter-century and an average of 115 million households. In fact, in the last 20 years, the average annual increase in local government expenditures in the United States has been 25 times the annual *Costs of Sprawl* projection.

Econometric Analysis. The source of data for this paper is the United States Bureau of the Census database for 2000. We used this database to conduct an econometric analysis that sought to

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identify the factors that are most important in explaining the differences in municipal expenditures. Data were available for more than 700 municipalities in the year 2000. We developed three econometric models.

The first, the General Government Model, was used to estimate the impact of factors such as population density, crime rates, and 11 others on municipal expenditures per capita. With respect to the Current Urban Planning Assumptions, no practical relationship was found between municipal expenditures per capita density, population growth rate, or community age. The impact of density of municipal expenditures was found to be statistically significant, but the predicted impact was trivial. Theoretically, if the nation were to reverse 40 years of suburbanization, the annual savings per capita would purchase a dinner for two at a moderately priced restaurant.

Further, the combination of factors that seemed likely to affect municipal spending (both those related to the Current Urban Planning Assumptions and others) explained less than 30 percent of the variation in municipal expenditures per capita. The other two econometric models showed that none of the Current Urban Planning Assumptions bore a statistically significant relationship to the variation in municipal wastewater charges or water charges. This is particularly significant, since these infrastructure functions are among those cited most often in claims that suburbanization imposes additional costs.

Nominal Analysis. A nominal (ranking) analysis of the actual data was also performed. The actual data indicate relationships considerably at variance with the Current Urban Planning Assumptions. The highest density, slowest growing, and oldest municipalities all had higher-than-average expenditures per capita. The oldest municipalities had the highest expenditures.

Employee Compensation. By far the largest expenditure category for municipalities is employee compensation. A further nominal analysis indicated that virtually all of the variation in municipal expenditures per capita could be explained by the variation in employee compensation. For example, the highest density quintile of municipalities spent $68 per capita each year more than the average. Wages and salaries in the same municipalities were $91 higher.

Special Interest Control and Entrenchment? In short, this analysis indicates that higher payroll costs are associated with larger, older municipalities. Local government employees have a significant, concentrated interest in improving their compensation and working conditions. This could be indicative of a political "entrenchment" that results from special interest control—an influence to which older municipalities would be more susceptible. Other special interests could exert similar influence, although employee compensation alone appears sufficient to account for the variation in municipal spending. It seems much more likely that the differences in municipal expenditures per capita are the result of political, rather than economic, factors—especially the influence of special interests.

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municipalities adopt measures to limit housing growth in their communities.

Typical of the concern that low-density development raises municipal costs—and therefore local taxes—is a contention in a recent, federally funded study of sprawl and costs that claims the United States "no longer can pay for the infrastructure necessary to develop farther and farther out in metropolitan areas."[2]

Current Urban Planning Assumptions. The U.S. urban planning community has adopted several assumptions about suburbanization and local government expenditures. These are outlined below and are referred to as the Current Urban Planning Assumptions in this paper.

1. ***Lower* spending per capita will be associated with *higher* population densities.** Thus, it is presumed that the more densely developed a community is, the less costly it will be to provide government services on a per capita basis. Conversely, the more widely dispersed development is (as in a community in which houses are spread out on large lots), the higher will be local government expenditures per capita.
2. ***Lower* spending per capita will be associated with *lower* rates of population growth.** This is based upon the belief that the burden of building new infrastructure in newer, growing communities is greater than it would be to expand or use latent capacity in older, slower-growing communities.
3. ***Lower* spending per capita will be associated with *older* municipalities.** It is assumed, for example, that the existing infrastructure of older municipalities has latent capacity, can be expanded, or can be used more intensively for less than the costs of building infrastructure in newer, more sprawling municipalities (which are virtually always suburban). At least partially as a result of this belief, current urban planning theory places a priority on construction within highly developed areas (referred to as "infill" development) instead of in undeveloped areas (referred to as "greenfield" development).

Belief in these assumptions provides support to urban planners and others who are interested in limiting suburban development and, in extreme cases, outlawing development outside "urban growth boundaries" or designated "growth areas."

In fact, however, virtually all of the research on which the Current Urban Planning Assumptions are based is theoretical, projecting relative costs into the future without examining the actual expenditures that are being made today by municipalities of differing urban forms and ages. The analysis in this paper reviews actual municipal expenditure data in relation to the Current Urban Planning Assumptions. Among the findings:

- Based upon an econometric analysis of data from the year 2000 for more than 700 municipalities, we conclude that none of the Current Urban Planning Assumptions is associated with any practically significant variation in local government expenditures per capita. In addition, the econometric analysis is able to account for less than 30 percent of the variation in local government expenditures per capita. This indicates that other factors, not accounted for in the econometric formula, are more important.
- Based upon a nominal (ranking) analysis of the same dataset, we conclude that the Current Urban Planning Assumptions are almost 180 degrees opposite the reality of municipal expenditures. The highest density municipalities have higher than average expenditures per capita; the slowest growing municipalities have higher than average expenditures per capita; and the oldest municipalities have the highest expenditures of all per capita.

1. Urban sprawl is often thought of as an American phenomenon. In fact, sprawl has been occurring throughout the high-income world and much of the low- and middle-income world. Virtually all population growth in major Western European urban areas has been outside the urban cores for at least three decades, occurring mostly in suburban style settings.
2. Robert W. Burchell, *et al.*, *Costs of Sprawl—Revisited* (Washington, D.C.: National Academy Press, 1998), p. 3.

140 times the $9.1 billion in average annual additional costs projected in *Costs of Sprawl—2000* for 2000 through 2025.[6]

- From 1980 to 2000 (inclusive), the total increase in local government expenditures in the United States was $4.5 trillion (in 2000 dollars adjusted for the increase in population), or $225 billion per year. This is approximately 25 times the $9.1 billion average additional public *and* private costs projected in *Costs of Sprawl—2000*.[7]

Municipal Expenditures: Econometric Analysis

Because the authors of the *Costs of Sprawl—2000* mix public and private expenditures that they claim are related to sprawl, the study's findings offer little guidance on one of the key public policy issues related to suburbanization: What are the actual, additional municipal costs that suburbanization imposes on the community at large, if any? This report will attempt to fill that void by conducting an econometric analysis (see box) of municipal spending patterns to determine what portion of municipal costs appear to be related to the impact of sprawl.

If the Current Urban Planning Assumptions are valid, the trends that *Costs of Sprawl—2000* identifies—having been underway for at least five decades—should reveal clearly the differences in expenditures between less sprawling and more sprawling areas. This means that older, higher density municipalities should have lower costs per capita than newer, lower density, more sprawling areas. These differences should be evident in the present spending patterns of local governments.

For an issue that has galvanized public debate in many communities throughout the country, there is little comprehensive, academic research on the actual relationship between land-use patterns and local government costs. The most recent research was published some time ago and is based upon early 1980s data. It was conducted by Professor Helen Ladd at Duke University, who performed an econometric analysis of growth measures and the actual public expenditures of 247 counties. She found that per capita expenditures on public services tend to *rise* as density rises and that higher population growth is associated with *lower* per capita local government expenditures—precisely the opposite of Current Urban Planning Assumption #1, above.[8]

Because the data used in her study are now more than two decades old, there is a need for more contemporary research on the factors that drive local government expenditures, especially in view of the predominant influence of "smart growth" urban planning theories. The purpose of this paper is to fill that gap with municipal cost data drawn from the 2000 Census.

Source of Data. Although the term "sprawl" has no precise definition, its most fundamental characteristic is lower population density. Smart growth advocates presume that building less sprawling, higher density communities results in lower government expenditures. If this is indeed the case, an analysis of municipal spending patterns across the country should show that as population densities go up, costs go down—and vice versa.

In order to reliably capture the impact of density on local government spending, we analyzed data for municipalities (cities and towns) rather than counties[9] because that is the level of government most affected by finance issues regarding utilities (wastewater and water) and general public services. The source of municipal financial data for the analysis in

5. Adjusted for population increase.
6. Estimated from U.S. Department of Commerce data. Assumes a constant rate of annual increase from 1980 to 2000.
7. Estimated from U.S. Census Bureau data. Assumes a constant rate of annual increase from 1980 to 2000.
8. Helen Ladd, "Population Growth, Density and the Costs of Providing Public Services," *Urban Studies* Vol. 29, No. 2 (1992), pp. 273–295.
9. This is not the case for other local units of general government, such as counties and townships. These generally include much rural (non-urban) land. As a result, density data for other local government units is not reflective of urban densities.

this paper is the U.S. Census Bureau government finance database for fiscal year 2000, which contains information for approximately 1,800 municipalities. Additional data for municipalities are available from other sources, such as the 2000 U.S. Census (demographic and density data) and the U.S. Department of Justice (crime rates). Another advantage of using municipal (rather than county) data is that municipal boundaries typically contain little rural space; therefore, the population density within those boundaries is generally similar to urban population density.

Because the current urban planning debate is principally focused on where development occurs within the nation's largest metropolitan areas, the municipalities analyzed in this study included only those within metropolitan areas of more than 1,000,000 residents in 2000.[10] Consolidated city-counties were not included, because such municipalities provide both city and county services and would be expected to have inherently higher expenditures as a consequence.[11]

The analysis in this paper does not include primary and secondary education costs. Most of the nation's primary and secondary education is provided by independent school districts that seldom match municipal (or county) boundaries. As a result, there is little, if any, broad demographic data specific to the geographical areas served by such districts. Related research indicates that, contrary to Current Urban Planning Assumption #2, elementary and secondary education expenditures tend to be lower in school districts with the greatest enrollment growth, and highest where there is the least growth.[12] Our research focuses on municipal costs in three categories:

- Government expenditures (all costs except for utilities and education);
- Municipally owned wastewater utility charges; and
- Municipally owned water utility charges.

Econometric Models. For purposes of this study, three econometric models[13] were developed to estimate the relationships between various factors and municipal expenditures:

- The *General Government Model* was developed to estimate the relationship between municipal current expenditures per capita and growth-influencing factors;
- *Wastewater Charges Model*; and
- *Water Utility Charges Model.*

The Wastewater Charges and Water Utility Charges models were developed to capture the impact of density, growth, and age of community on the cost of these functions. These are frequently cited in the urban planning literature as being upwardly affected by more sprawling development.

Another reason for analyzing utility charges separate from general government functions is that water and wastewater services are generally financed by user fees, rather than by the general tax revenues that finance most other municipal government operations. In fact, these utilities are not inherently government services: In many communities, regulated private companies provide such functions.[14]

General Government Model

The General Government Model estimates the impact of a number of factors on per capita municipal government expenditures, excluding utilities and

10. Metropolitan areas of more than 1,000,000 residents comprised approximately 58 percent of the nation's population in 2000 (2000 metropolitan definitions). The 49 such areas had a combined population of 163 million, out of a national total of 281 million (Table H-10).
11. As a result, jurisdictions such as New York, Philadelphia, San Francisco, Baltimore, St. Louis, Miami, New Orleans, Indianapolis, and Lexington, Kentucky were excluded.
12. Byron Schlomach and Wendell Cox, *A Look at School Facilities Funding in Texas,* Texas Public Policy Foundation, 2004 at *http://www.texaspolicy.com/pdf/2004-04-facilities.pdf* (June 15, 2004).
13. This research uses multi-linear regression analysis. Independent variables (such as population density) were chosen. These were theorized to have some impact on municipal expenditures per capita (the dependent variable).
14. Water and wastewater utilities in France also tend to be privately owned.

Econometric Models: Statistical Significance and "Practical Significance"

Our econometric analysis relies on the use of the "multiple linear regression model," a commonly used statistical analysis tool that measures the effect of a number of factors (*independent variables*) on a single factor (*dependent variable*). This paper attempts to estimate the association between independent variables thought to have an influence on municipal expenditures (such as population density and crime rate as shown in Table 2) and the dependent variable of municipal government expenditures per capita.

The multiple linear regression models provide two types of results important to the analysis. First, the model estimates the coefficient on each independent variable. This coefficient measures the estimated impact of changes of the independent variable (such as average house value) on the dependent variable (such as average expenditures). Second, each coefficient is paired with a mathematically estimated level of confidence in the two variables' relationship. Economists generally require a confidence level of 95 percent, calling such a relationship "statistically significant." A statistically significant variable is a reliable predictor of the dependent variable, taking the other independent variables in the model as fixed.

Yet statistical significance (a reliable predictive relationship) does not mean that the relationship is of practical significance (economically or mathematically significant.)[1] An econometric model may find a statistically significant relationship between a variable and a result but that relationship may not be material. Statistical significance is a measure of the reliability of an association between one factor and another. However, the mathematical or practical effect may be either small or large.

Practical significance is calculated as the percent change in the dependent variable (in the case of the present research, municipal expenditures) divided by the percent change in the independent variable (for example, population density or median house age). Practical significance is virtually the same thing as "elasticity." For practical significance to exist, however, requires statistical significance. By definition, a relationship that is not statistically significant cannot be practically significant.

continued at Econometric Models ... *on next page*

1. In recent years several academic economists have turned their attention to the potential policy implications of an analytical process that may be putting too much weight into whether a relationship between economic variables is statistically significant—at the expense of other analytical relationships between variables. Specifically, they are examining whether the relationship revealed by statistical methods makes economic sense and whether the relationship is of a meaningful magnitude. One of the early studies on this subject was published by professors Deirdre McCloskey and Stephen Ziliak in the March 1996 issue of the *Journal of Economic Literature*. It was titled "The Standard Error of Regressions." A recent review of this academic debate was reviewed in the January 31, 2004, issue of *The Economist*, in an article titled "Signifying Nothing?" on page 76.

education. The model uses 13 factors that would be expected to influence local government expenditures (current and capital expenditures)[15] per capita. These include factors that test the Current Urban Planning Assumptions (population density, population growth, and community age as indicated by median house ages). There were sufficient data for 738 municipalities to be included in the General Government Model.[16] Table 2 lists the variables included in the General Government Model.

General Government Model Results. The results indicate that the 13 factors in the General

Econometric Models ... *continued from previous page*

If, for example, it were determined that there was a statistically significant association between higher house value and higher municipal spending, then the question of practical significance becomes important. If a 50 percent increase in average house value is associated with a 1 percent increase in municipal spending per capita, the elasticity would be 0.02, or two percent, which would not be considered of practical significance. If, on the other hand, a 50 percent increase in average house value is associated with a 25 percent increase in municipal spending per capita, the elasticity would be 0.50 (50 percent), which would be a number large enough to be practically significant.

These distinctions can be missed when statistical significance is overzealously characterized in such a way as to imply practical significance. One example is highly publicized recent research that found a statistically significant relationship between urban sprawl and obesity—but the actual weight differences predicted by the model were far from being practically significant. The difference in average weight between high-density central counties and low-density (more sprawling) suburban counties was predicted by the model to be less than one pound in many metropolitan areas.[2] Regrettably, in this case, advocates of government policies aimed at combating sprawl wittingly or unwittingly appear to have misled reporters and elected officials, who were led to believe that statistical significance, in and of itself, meant practical significance. It does not.

2. Barbara A. McCann and Reid Ewing, *Measuring the Health Effects of Sprawl*, Smart Growth America and the Surface Transportation Policy Project, September 2003.

Government Model explain approximately 29 percent of the variation in municipal expenditures, as revealed in Table 3.[17] This means that 71 percent of the variation in total expenditures is not explained by the factors included in the model, but rather by other influences which cannot be quantified or for which there are no available or accurate data. The conclusion is that, contrary to the theory, comparatively little of the variation in municipal costs is associated with the Current Urban Planning Assumptions. Other factors, which have not been identified, are more important.

As Table 3 reveals, 8 of the 13 factors were reliable predictors of either higher or lower municipal spending per capita (at a statistically significant 95 percent level of confidence). These factors are: poverty rate, local/state expenditure ratio, state and federal aid, density, persons per household, owner-occupied housing (percent of housing units occupied by owners rather than renters), median house value, and crime rate.

As the discussion in the box indicates, statistical significance does not necessarily denote practical significance. A factor may be a reliable predictor of an impact, but the impact itself may be small. Among the 13 growth-related factors analyzed in the General Government Model, practical significance varied widely. The local-to-state expenditure ratio[18] had the highest practical significance (a 100 percent increase in the ratio of local govern-

15. Current expenditures are the day-to-day costs of operations, such as employee compensation, materials and supplies, and professional service contracts. Capital expenditures are for construction and acquisition of assets, such as vehicles, data processing equipment, furniture, etc.

16. The municipalities in the sample contained 63 million people in 2000 (39 percent of the total population in metropolitan areas over 1,000,000).

17. R^2=0.29.

ment spending to total state and local government spending would be associated with a 55 percent increase in per capita expenditures—a practical significance of 55 percent). The other variables with comparatively high practical significance were persons per household (–42 percent), owner-occupied housing (–30 percent), crime rate (+25 percent) and median house value (+25 percent). The other reliably predictive (statistically significant) factors had practical significance less than 15 percent.[19]

Table 2 B 1770

Regression Variables

Variable	Definition
SPENDING	Municipal spending per capita (in thousands)
SEWER	Wastewater charges per capita (in thousands)
WATER	Water charges per capita (in thousands)
POV%	Percent of population below the poverty rate
POP2000	Population in 2000
HAGE	Median age of owner-occupied housing
L/SDGE	Ratio of local to state and local direct government expenditures
S&FAID$	Total of state and federal aid per capita (in thousands)
DENSITY	Population density (per square mile)
POP%	Percentage population change between 1990 and 2000
P/HHLD	Persons per household
OWNOCC%	Percent of housing occupied by owners
HOUSE$	Median house value (actual)
SR%	Percent of population over 65
AREA	Land area (square miles)
CRIME	Crime rate per capita (2000 or 2001 if not available for 2000)

All data 2000 except as noted.

Population Density. The results derived from the General Government Model are consistent with the Current Urban Planning Assumption #1 that associates higher densities with lower municipal government expenditures—but only weakly so. The relationship was statistically significant (99 percent), but there was little practical significance, which would indicate that higher population density is associated with only a small downward variation in municipal costs per capita. The mathematical significance or elasticity was 0.146: Each 10 percent increase in density could be expected to produce a 1.46 percent decrease in municipal expenditures per capita. For the average municipality, each 1,000 increase in population per square mile[20] is associated with a $43 per capita reduction in municipal expenditures. This is a minuscule expenditure decrease compared with the substantial increase in density required to trigger it. In other words, a virtually unprecedented increase in population density in an already urbanized area would trigger an decrease in expenditure equal to the price of dinner for two at a moderately priced restaurant.[21]

Population Growth. Population growth, the factor associated with Current Urban Planning Assumption #2 was not statistically significant and could not therefore be practically significant. Thus, the results from the model do not support Current Urban Planning Assumption #2, indicating no significant relationship between higher population growth and higher municipal expenditures per capita.

Median House Age. Median house age, the factor associated with Current Urban Planning Assumption #3 was not statistically significant and could not therefore be practically significant. Thus, the results from the model do not support Current Urban Planning Assumption #3, indicating no significant relationship between newer

18. This factor (local direct general expenditures as a percentage of state government plus local government direct general expenditures) was included to capture the differences (by state) in expenditure distribution between state and local governments.
19. Negative or positive.
20. Average population density of the sample was 3,776 per square mile; a 1,000 increase in population density would increase densities by more than 25 percent.
21. There have been virtually no density increases of such a magnitude in municipalities that do not have broad expanses of undeveloped space.

communities and higher municipal expenditures per capita.

Interestingly, the inclusion of the three factors that measure the impact of the Current Urban Planning Assumptions add little to the explanatory value of the General Government Model as here specified. Only one—population density—was found to be statistically significant (and of little practical significance). Excluding these three variables (population density, population growth, and median housing age) and re-running the model with the remaining ten factors yields an R-squared of 0.24, meaning that the model as so specified explains only 24 percent of the measured expenditure variability from one municipality to another. Adding the three growth-related variables to these ten factors brings the R-squared up to only 0.29, meaning that the inclusion of the growth variables improves the explanatory value of the model by only five percentage points. This is not much of an impact for issues that are alleged to be having important effects on government costs in growing communities.

Table 3 B 1770

General Government Model: Expenditures per Capita
Dependent Variable: Spending

Variables	Coefficient	Mean	Std. Error	Probability	Statistical Significance	Practical Significance (Elasticity at the Mean)
POV%	1.223	0.10	0.60	0.04	95%	0.109
POP2000	0.00000010	82,731	1.7E-07	0.54		0.008
HAGE	-0.00032	32.91	1.9E-03	0.87		-0.009
L/SDGE	1.056	0.58	0.40	0.01	99%	0.547
S&FAID$	0.391	0.27	6.0E-02	0.00	99%	0.094
DENSITY	-0.000043	3,776	0.00	0.00	99%	-0.146
POP%	0.232	0.04	0.13	0.09		0.008
P/HHLD	-0.173	2.69	0.07	0.01	99%	-0.417
OWNOCC%	-0.543	0.62	0.23	0.02	95%	-0.304
HOUSE$	0.0000016	166,833	2.2E-07	0.00	99%	0.246
SR%	0.191	0.12	0.55	0.73		0.020
AREA	-0.00022	28.184	6.0E-04	0.71		-0.006
CRIME	6.102	0.05	0.91	0.00	99%	0.250
R-squared	.29	Mean D.V.	1.11			
Observations	738					

Wastewater Charges and Water Charges Models

Neither the Wastewater Charges Model nor the Water Utility Model indicated strong relationships between the identified factors and user charges, as Tables 8 and 9 demonstrate (see Appendix). The Wastewater Charges Model explained 12 percent of the variation in wastewater user charges per capita, while the Water Charges Model explained 8 percent of the variation in water charges per capita.[22] Thus, the Wastewater Charges Model failed to explain 88 percent of the variation in wastewater charges, and the Water Utility Model failed to explain 92 percent of the variation in water charges. This suggests that influences other than those variables included in the model explain much of the differences in utility costs from one community to another.

With respect to the Current Urban Planning Assumptions, only density was found to be statistically significant, but of little practical significance. In the Wastewater Charges Model, density exhibited a practical significance of minus 18.0 percent, consistent with Current Urban Planning Assumption #1. Similarly, density's practical significance of minus 12.5 percent in the Water Utility Model was consistent with Current Urban Planning Assumption #2 (Tables 2, 8, and 9). However, this translates into only small impacts on consumer costs. A 1,000 person-per-square-mile difference in average population density is associated with a $6 difference in annual wastewater charges per capita, or fifty cents per month.

22. There were 764 wastewater observations (Wastewater Charges Model) and 713 water (Water Charges Model) observations.

In other words, a 1,000 person-per-square-mile difference is associated with an annual water charge difference of $4 per capita, or thirty-three cents per month—less than a penny per day. Obviously, such trivial savings in waste water and water-related costs cannot justify public policies that would force major changes in existing lifestyles or land-use patterns.

It is particularly significant that none of the Current Urban Planning Assumptions were associated with a statistically significant relationship with the variation in Wastewater Charges or Water Charges. These infrastructure functions are among those cited most often in claims that suburbanization imposes additional costs.

Alternative Measures of Relationship: A Nominal Ranking Analysis

Another way to analyze the same data is to rank it by categories that reflect varying degrees of difference in some of the key independent variables (such as density) and relate these categories to the different cost measures that comprise the key dependent variables. The existence or absence of any obvious trends indicates how strong or weak the relationships are. Using the same Census data, a nominal (ranking) analysis by quintiles (20 percent rankings) was performed on the sample to determine whether the statistical relationships that the Current Urban Planning Assumptions would predict are actually evident in the data (Table 4).

As the nominal rankings reveal, none of the growth-related variables show the relationship with municipal expenditures that is predicted by the Current Urban Planning Assumptions. This confirms the findings of the econometric analysis, which was only able to explain a relatively small fraction of the cost differences among communities, and where only one of the growth-related variables (population density) was found to be statistically significant, but not practically significant, at conventional confidence intervals.

Table 4 B 1770

Summary of Nominal Analysis Results: General Government Expenditures per Capita, 2000

Population Density	Average Density (Population per square mile)	Nominal Analysis: Actual Expenditures	Rank: Actual Expenditures
Highest (1)	9,086	$1,180	4
Higher (2)	4,160	$979	1
Middle (3)	2,883	$1,045	2
Lower (4)	1,860	$1,094	3
Lowest (5)	900	$1,265	5
Average (Mean)	3,776	$1,112	
Maximum Difference		29.2%	

1990–2000 Growth	Average Growth	Nominal Analysis: Actual Expenditures	Rank: Actual Expenditures
Lowest (1)	-0.6%	$1,131	4
Lower (2)	0.5%	$1,190	5
Middle (3)	1.4%	$1,120	3
Higher (4)	2.7%	$1,032	1
Highest (5)	14.9%	$1,089	2
Average (Mean)	3.8%	$1,112	
Maximum Difference		15.3%	

Municipality Age	Average Age	Nominal Analysis: Actual Expenditures	Rank: Actual Expenditures
Highest (1)	54.8	$1,252	5
Higher (2)	42.4	$1,142	4
Middle (3)	31.9	$1,120	3
Lower (4)	22.8	$1,026	2
Lowest (5)	12.6	$1,021	1
Average (Mean)	32.9	$1,112	
Maximum Difference		22.7%	

- **Population Density.** The Current Urban Planning Assumptions would predict that the lowest expenditures per capita would be in the highest population density quintile. In fact, expenditures per capita in the highest density quintile were the second *highest,* and were above average.

Only the lowest density quintile (#5) had higher municipal expenditures per capita. It should be noted that the population density of quintile #5 is very low, and below the general U.S. Census Bureau urbanized area threshold of 1,000 persons per square mile. Expenditures per capita were lower than average in the middle three quintiles, which are more reflective of the suburban population densities that have developed in the United States since 1950. The lowest expenditures per capita were in quintile #2—the second-highest density quintile. This quintile's average density is comparatively low—approximately 10 percent above the average density for the entire database and more than 40 percent lower than the average density of U.S. urbanized areas with populations over 500,000 in 1950.[23] The implication is that higher density does not lower local government expenditures per capita.

- **Population Growth Rate.** The actual expenditure data indicate that quintile #1 (which has the lowest population growth rate) has the second highest expenditures per capita—at a level above the average. Like the population density conclusion, the actual spending data are inconsistent with what would be expected based upon the Current Urban Planning Assumptions.
- **Municipality Age.** Municipality age provides the most stark inconsistency with the Current Urban Planning Assumptions. The oldest municipalities (quintile #1) have the highest expenditures per capita, precisely the opposite of what would be expected. The lowest expenditures per capita are in the newest communities (quintile #5), which is also the opposite of what the Current Urban Planning Assumptions would predict.

The most dense municipalities (quintile #1) also failed to have the expected lowest wastewater charges per capita or the lowest water charges per capita. Quintile #1 municipalities did, however, have lower than average wastewater charges, though only of $7 per capita per year—hardly rising to the level of "unaffordable." There was little difference between the quintiles in water charges per capita. (See Tables 10 and 11 in Appendix.) Thus, the pattern in the nominal data (actual ranked data) for utilities was different than predicted by the econometric analysis.

Thus, the actual expenditure data reveal that more dense, slower growing, and older municipalities do not have lower expenditures per capita—the opposite of what would be expected if the Current Urban Planning Assumptions were correct.[24]

Table 5 B 1770

Nominal Analysis Results: Local Government Employee Compensation

Population Density	Average Density	Estimated Wages & Salaries
Highest (1)	9,086	$457
Higher (2)	4,160	$357
Middle (3)	2,883	$349
Lower(4)	1,860	$347
Lowest (5)	900	$321
Average (Mean)	3,776	$366

1990–2000 Growth	Average Growth	Estimated Wages & Salaries
Highest (1)	-0.6%	$410
Higher (2)	0.5%	$450
Middle (3)	1.4%	$373
Lower(4)	2.7%	$312
Lowest (5)	14.9%	$285
Average (Mean)	3.8%	$366

Municipality Age	Average Age	Estimated Wages & Salaries
Lowest (1)	54.8	$493
Lower (2)	42.4	$386
Middle (3)	31.9	$377
Higher (4)	22.8	$297
Highest (5)	12.6	$277
Average (Mean)	32.9	$366

23. Calculated from U.S. Census Bureau data.

Other Potential Municipal Expenditure Drivers

The fact that the econometric analysis explains so little of the variation in municipal costs per capita, combined with the fact that the highest density, slowest growing, and oldest communities do not have the lower expenditures per capita predicted by the Current Urban Planning Assumptions, would seem to indicate that other factors are more important drivers of variation in municipal costs between communities.

The most obvious place to look is local government employee compensation. Employee compensation is by far the largest expenditure function for most local governments, consuming, on average, 64 percent of total current expenditures.[25] Employee compensation is approximately 3.5 times capital expenditures.[26]

Employee compensation varies significantly between jurisdictions. Census Bureau information indicates that local government average wages and salaries for similar positions and skills vary by as much as 93 percent between some states.[27] These cost disparities are not necessarily explained by regional differences. For example, in the Denver metropolitan area the municipality with the highest wages and salaries per capita pays nearly 1.5 times the area average, and more than five times the municipality with the lowest wages and salaries per capita. Further, there are also significant differences (up to 123 percent) between the percentage add-on of employer-paid employee benefits costs among local governments by state.[28]

There are other factors that could be responsible for such large variations. There could be significant variations between the numbers of hours actually worked by government employees. This is evident at the state level, where differences of up to 38 days annually have been shown.[29] Thus, it seems likely that differences in municipal government employee compensation per capita could be an important factor in explaining differences in municipal expenditures.[30] Finally, there could be significant variations in the number of employees, or in employee productivity.

Although the available data cannot be used to econometrically test the impact of public employee compensation on municipal costs, the nominal ranking analysis used in the previous section can be extended to include a review of government employee compensation.[31] Table 5 provides an estimate of per-capita municipal employee wages and salaries for each set of quintile rankings for the three urban planning, growth-related variables.

As the data in Table 5 illustrate, virtually all of the difference between the highest municipal expenditure quintile and the lowest is accounted for (or more than accounted for) by the difference in municipal employee compensation per capita. This indicates that differences in employee com-

24. It has been suggested by some that older, more densely populated municipalities subsidize newer, more suburban municipalities. In fact, however, the nominal analysis indicates the opposite. The quintile of municipalities with the highest state and federal aid per capita average 45 years old ($852 annually per capita). This is nearly four times that of the second quintile (36 years and $218). The three lowest state and federal aid quintiles have average ages of from 26 to 31 years.

25. Calculated from U.S. Census Bureau data for 2000, adding the state and local government employer-paid employee benefits factor calculated from the National Income and Product Accounts.

26. Includes the cost of building new water and wastewater systems.

27. Calculated from U.S. Census Bureau 2001 government employee database.

28. The latest available comprehensive information on local government employer-paid employee benefits was the 1987 U.S. Census of Governments, from which this figure was calculated.

29. Wendell Cox and Samuel A. Brunelli, *America's Protected Class III* (Washington, D.C.: American Legislative Exchange Council, 1994), p. 29, Table C-3. No similar data have been published for localities.

30. It is also likely that differences in hourly employee compensation per capita would be an important determinant of differences in other government total expenditures, such as at the county, school district, township (and comparable governments) and special district levels.

Table 6 B 1770

Variation in Municipal Expenditures and Wages and Salaries per Capita: Top Quintiles

Local Government Expenditures per Capita

Assumed Association with Lowest Spending per Capita (Current Urban Planning Assumption #)	Actual	Average	Difference	Consistent with Current Urban Planning Assumption
#1: Highest Density Quintile	$1,180	$1,112	$68	NO
#2: Slowest Growth Quintile	$1,131	$1,112	$19	NO
#3: Oldest Communities Quintile	$1,252	$1,112	$140	NO

Estimated Wages & Salaries per Capita

Assumed Association with Lower Spending per Capita	Estimate	Average	Difference	Compared to Difference in Expenditures
#1: Highest Density Quintile	$457	$366	$91	134%
#2: Slowest Growth Quintile	$410	$366	$44	232%
#3: Oldest Communities Quintile	$493	$366	$127	91%

pensation—not growth factors—may be the strongest driver of municipal expenditures.

- **Population Density.** Wages and salaries per capita tend to rise from quintile 5 (lowest) to quintile 1, which has, by far, the highest expenditures in the highest density quintile.
- **Population Growth Rate.** The highest wage and salary expenditures per capita are in the slowest growing quintiles (quintiles 1 and 2), and lowest in the fastest growing quintiles (quintiles 4 and 5).
- **Municipality Age.** As illustrated in Figure 1, the highest wage and salary expenditures per capita are in the oldest municipalities (quintiles 1 and 2), with the lowest expenditures in the newest municipalities (quintiles 4 and 5).

Each of these conclusions works strongly against what one might expect from the Current Urban Planning Assumptions. This is illustrated by reviewing the data for the quintiles under each Current Urban Planning Assumption that would be expected to have the lowest expenditures per capita. Table 6 indicates that differences in employee compensation alone are more than sufficient to account for the differences in municipal expenditures per capita—whether by density, population growth, or municipality age.

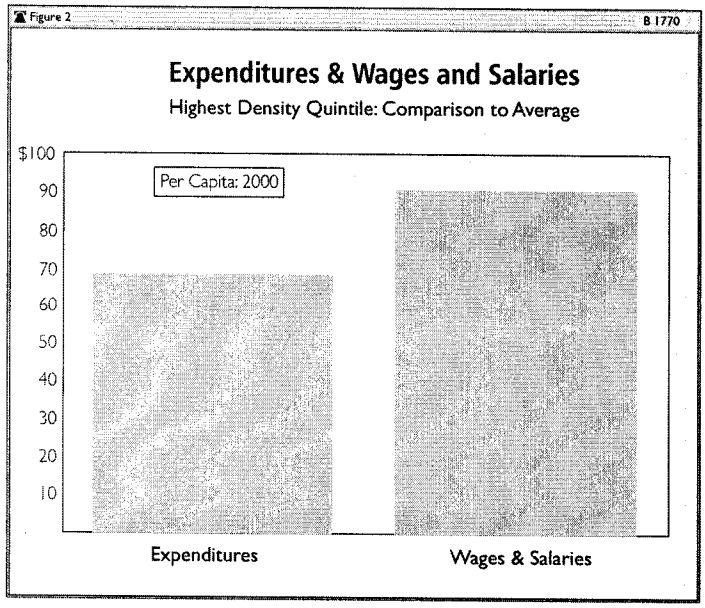
- **Population Density.** The variation from the average in wages and salaries per capita in the highest density municipalities is larger (1.34 times) than the variation from the average for the same municipalities in local government expenditures, as shown in Figure 2.
- **Population Growth Rate.** The variation from the average in wages and salaries per capita in the slowest growing municipalities is larger (2.32 times) than the variation from the aver-

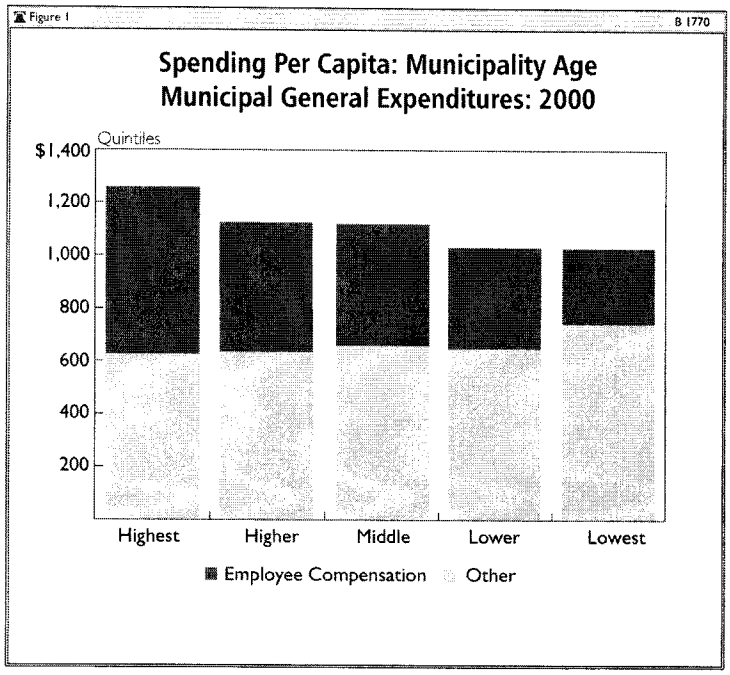
31. Employee compensation is estimated using the gross local government wages and salaries data from the Census Bureau database, scaled downward to exclude utilities and education and increased by the average 24.5 percent cost of employer paid employee benefits. Because wastewater and water expenditures are small compared to overall municipal expenditures, it was not considered reliable to estimate wages and salaries for these functions using the same formula.

age for the same municipalities in local government expenditures.

- **Municipality Age.** The variation from the average in wages in salaries per capita in the oldest municipalities is nearly as large (0.91 times) as the variation from the average for the same municipalities in local government expenditures. If the average employer-paid benefits add-on is included, the variation in employee compensation would be larger than the difference in expenditures (1.12 times).

In fact, the impact of increases in local government employee compensation has been far greater than the sprawl-based costs projected in *Costs of Sprawl—2000.* From 1980 to 2000, the gross additional local government employee compensation alone in the United States was nearly $2.2 trillion (in 2000 dollars)—or more than $105 billion per year. This is approximately 12 times the $9.1 billion average annual additional cost projected in *Costs of Sprawl—2000.*[32]





An Alternative Explanation for Differences in Municipal Spending: Political Entrenchment

The generally higher spending levels of the older municipalities may be due to a process of "political entrenchment" that occurs with the passage of time. The large impact of local government employee compensation indicates that internal employee interests may be a principal factor driving municipal expenditures per capita. According to the nominal ranking analysis presented in Table 7, there appears to be a strong relationship between higher employee wages and salaries per capita and higher density, lower population growth rates, community age, and higher population—all of which are in opposition to what would be expected if the Current Urban Planning Assumptions were correct.

- **Population Density.** The highest wages and salaries quintile has the highest population density. Densities decrease with each quintile, with the

32. Estimated from U.S. Department of Commerce data. Assumes a constant rate of annual increase from 1980 to 2000.

lowest wages and salaries quintile having the lowest population density.

- **Population Growth Rate.** The highest wages and salaries quintile has the lowest population growth rate. Population growth rates increase with each quintile, except for the highest growth quintile (quintile 5). The second-fastest growing quintile (quintile 4) has the highest population growth rate.
- **Municipality Age.** The highest wages and salaries quintile has the oldest average municipality age. Community age decreases with each quintile, with the lowest wages and salaries quintile being the youngest.

Table 7 B 1770

Nominal Analysis Results: Estimated Wages & Salaries per Capita: Quintiles

Quintile	Estimated Wages & Salaries	Expenditures	Density	Growth Rate	Municipality Age	Population
Highest (1)	$0.693	$1,821	4,802	1.1%	42.0	131,202
Higher (2)	$0.424	$1,235	3,887	2.4%	35.4	100,495
Middle (3)	$0.324	$1,059	3,699	3.0%	33.0	87,418
Lower (4)	$0.243	$802	3,172	4.5%	27.8	51,878
Lowest (5)	$0.147	$646	3,324	7.9%	26.4	42,630
Average (Mean)	$0.366	$1,112	3,776	3.8%	32.9	82,731

Perhaps reflecting such entrenchment, older municipalities have often been notably resistant to cost-effective management innovations such as privatization, competitive contracting, more flexible labor arrangements, and innovative management techniques.[33] For example, the oldest quintile of municipalities had a general government expenditure level 23 percent higher than the youngest (Table 5).

It must be pointed out, however, that employee compensation is not likely to be the only cost function that could be exercising undo special-interest influence on the costs of local governments. Other political interests not quantified (and perhaps not quantifiable) may also exercise an impact on municipal spending.

Larger governmental units—which also tend to be more dense and older[34]—may be inherently more susceptible to special-interest capture, whether employee, business, labor, or other. Generally, it can be expected that the influence of individual voters would be less in larger jurisdictions and that special interests would be more likely to exert control. Larger jurisdictions would seem to provide economies of scale for lobbying. It would seem reasonable that where there is greater opportunity for special-interest control, government costs are likely to be higher. The data in Table 7 indicate that the highest wages and salaries quintile (quintile 1) has an average population that is more than 50 percent larger than average, and that the average population of each succeeding quintile is lower. The lowest wages and salaries quintile (quintile 5) has the lowest population—approximately one-half the average. This finding is counter to another widely held urban planning assumption: that larger units of government are more cost effective due to economies of scale.

All of this seems to indicate that municipal costs are more susceptible to overwhelming influence by political interests than they are to economics.

33. This is illustrated by the case of public transit. In 2001, none of the approximately 100 older transit systems (established before 1980 or descended from pre-1980 systems) in major metropolitan areas competitively contracted their bus systems. By contrast, 56 percent of the newer, largely suburban systems competitively contract their bus systems. See Wendell Cox, *Performance Measures in Urban Public Transport,* paper presented to the 8th International Conference on Competitive and Ownership in Public Transport, Rio de Janeiro, 2003, at *www.publicpurpose.com/t8-gbc.pdf* (June 15, 2004).
34. This research indicates that the highest population quintile also has the highest population density and the highest expenditures per capita.

Theoretical studies, such as *Costs of Sprawl—2000* may suffer from what might be called the "length of pipe fallacy"—the assumption that labor rates, cost of materials, and the costs associated with apparently similar projects is the same in every local government jurisdiction in a metropolitan area.[35] In fact, older, inner-city government labor rates are often higher than suburban rates: Overheads may be higher and certainly the operating environment can be more challenging. For example, expansion of an inner-city sewer system is likely to be far more costly than laying a new one in a greenfield area.

"Entrenchment" may have first been noted by Adam Smith in *The Wealth of Nations*. He pointed out that historical control of guilds in the older cities had produced a situation in which prices were lower in the suburbs, which were beyond the reach of the guilds. This kept prices in the older cities above market levels.[36] Economist Mancur Olson similarly postulated that, as time goes on, political and special interests become more entrenched in older national governments.[37] Stronger bureaucracies, more powerful employee organizations, strong local business interests, political interests, and more rigid operating procedures may have developed over a longer time period. These may force costs in older municipalities to be higher than they would be in newer municipalities.

An "entrenchment" theory of municipal finance would be consistent with the findings of economist Charles Tiebout, who argued that people tend to "vote with their feet"—to move to newer communities that better meet their desires and needs. Relative tax levels were an important component of this thesis, which characterized the new suburban communities as competing with one another for new residents.[38]

Conclusions and Policy Implications

Our analysis indicates that the Current Urban Planning Assumptions are of virtually no value in predicting local government expenditures per capita. The lowest local government expenditures per capita are not in the higher density, slower growing, and older municipalities.

On the contrary, the actual data indicate that the lowest expenditures per capita tend to be in medium- and lower-density municipalities (though not the lowest density); medium- and faster-growing municipalities; and newer municipalities. This is after 50 years of unprecedented urban decentralization, which seems to be more than enough time to have developed the purported urban sprawl-related higher local government expenditures. It seems unlikely that the higher expenditures that did not develop due to sprawl in the last 50 years will evolve in the next 20—despite predictions to the contrary in *The Costs of Sprawl—2000* research.

It seems much more likely that the differences in municipal expenditures per capita are the result of political, rather than economic factors, especially the influence of special interests.

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35. For example, in Los Angeles—where many transit services are sponsored by newer, suburban agencies—costs per hour of service are 46 percent lower where provided under contract by agencies other than the core transit system Wendell Cox, *Competitive Participation in U.S. Public Transport: Special Interests Versus the Public Interest,* paper presented to the 8th International Conference on Competition and Ownership in Land Passenger Transport, Rio de Janeiro, 2003, at *www.publicpurpose.com/t8-cc.pdf* (June 15, 2004).
36. Adam Smith, *The Wealth of Nations* (New York: Modern Library, 1957), p. 129.
37. For example, such a theory is developed by Mancur Olson, *The Rise and Decline of Nations: Economic Growth, Stagflation and Social Rigidities* (New Haven and London: Yale University Press), 1982.
38. Charles M. Tiebout, "A Pure Theory of Local Government Expenditures," *Journal of Political Economy,* October 1956.

APPENDIX

Table 8 B 1770

Wastewater Charges Model: Wastewater Charges per Capita
Dependent Variable: Wastewater Charges

Variables	Coefficient	Means	Std. Error	Probability	Statistical Significance	Practical Significance (Elasticity at the Mean)
POP2000	0.000000022	82,569	2.1E-08	0.28		0.015
HAGE	-0.00027	32.86	2.7E-04	0.32		-0.074
DENSITY	-0.0000063	3,444	0.00	0.00	99%	-0.180
POP%	0.0027	0.03	0.02	0.90		0.001
P/HHLD	-0.024	2.68	0.01	0.00	99%	-0.531
OWNOCC%	-0.143	0.64	0.02	0.00	99%	-0.758
HOUSE$	0.000000021	162,517	3.0E-08	0.48		0.028
SR%	0.303	0.12	0.08	0.00	99%	0.303
AREA	-0.00017	28.382	7.9E-05	0.03	95%	-0.041
R-squared	0.12	Mean D.V.	0.12			
Observations	762					

Table 9 B 1770

Water Charges Model: Water Charges per Capita
Dependent Variable: Water Charges

Variables	Coefficient	Means	Std. Error	Probability	Statistical Significance	Practical Significance (Elasticity at the Mean)
POP2000	0.0000000056	85,584	2.1E-08	0.79		0.004
HAGE	-0.00013	31.96	3.0E-04	0.66		-0.036
DENSITY	-0.0000044	3,430	0.00	0.00	99%	-0.125
POP%	-0.0259	0.04	0.02	0.23		-0.008
P/HHLD	0.002	2.71	0.01	0.76		0.056
OWNOCC%	-0.114	0.64	0.03	0.00	99%	-0.605
HOUSE$	0.00000015	160,959	3.2E-08	0.00	99%	0.199
SR%	0.293	0.12	0.09	0.00	99%	0.286
AREA	-0.000024	29.277	8.2E-05	0.77		-0.006
R-squared	0.08	Mean D.V.	0.14			
Observations	713					

Table 10 B 1770

Summary of Econometric and Nominal Analysis Results: Wastewater Charges per Capita

Population Density	Average Density	Actual Expenditures	Rank: Actual Expenditures
Highest (1)	7,906	$114	2
Higher (2)	3,963	$109	1
Middle (3)	2,741	$117	3
Lower (4)	1,775	$127	4
Lowest (5)	844	$132	5
Average (Mean)	3,440	$121	
Maximum Difference		21.3%	

Table 11 B 1770

Summary of Econometric and Nominal Analysis Results: Water Charges per Capita

Population Density	Average Density	Actual Expenditures	Rank: Actual Expenditures
Highest (1)	8,031	$137	3
Higher (2)	3,873	$139	5
Middle (3)	2,695	$133	1
Lower (4)	1,736	$137	2
Lowest (5)	831	$139	4
Average (Mean)	3,430	$137	
Maximum Difference		4.8%	